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Abstract

It is noted that supervision of construction by school district inspectors is a twofold task--first, to provide a safe structure, and second, to insure that all phases of construction are performed in conformance with plans, specifications and other applicable codes, regulations, and directions. Within this context, guidelines are presented for construction inspection and supervision of school facilities. The manual is organized into the following sections--(1) job appointment, (2) inspector's code of ethics, (3) general outline of inspector's procedure, (4) inspection procedures by specification, (5) project completion and guarantee follow-up, and (6) miscellaneous. Sample inspection report forms are included. (FS)

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SUPERVISION AND INSPECTION OF SCHOOL CONSTRUCTION

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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CLARK COUNTY
SCHOOL DISTRICT

EF 003 645

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SUPERVISION AND INSPECTION OF SCHOOL CONSTRUCTION

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School Construction Department
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Las Vegas, Nevada

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FOREWORD

Personnel of the School Construction Department has undertaken the development of a manual on Supervision and Inspection of School Construction to provide a guideline for the construction inspection supervision of school facilities. An equally important function will be to provide the lay person with limited experience in this area, in a concise and readable form, essential information concerning the role of construction inspection.

This manual does not completely detail the duties of the Construction Inspector. It will serve its purpose only to the extent that those using it understand its intent and meaning with a constant endeavor to find ways to improve the inspection function.

Inspection by school district inspectors is twofold:

1. To provide a safe structure.
2. To insure that all phases of construction are performed in conformance with plans, specifications and other applicable codes, regulations and directives.

This manual is published as a guide and reference. None of the material contained herein is intended to overrule or supersede the project plans, specifications, applicable codes or ordinances and the good judgment of the inspection staff.

Stanley O. Bokelmann, Director
School Construction Department

INTRODUCTION

THE ROLE OF INSPECTION

The role of the Construction Inspector is a cooperative function with architects, engineers, contractors, utility firms, governmental agencies and school district administrators. Cooperation is necessary to promote the establishment of reasonable standards for buildings and equipment with due regard for health and safety of human life, dignity of design, utility of space and economy of expenditure.

Proper inspection is a specialized profession and receives the respect that the individual inspector earns. The inspector's own conduct and his understanding of what his job is and how he performs dispels any false notion of some architects, engineers, contractors and school boards that inpsectors are annoying and unnecessary persons that are forced upon them by law.

The inspector has a challenging opportunity to earn more in worthwhile results than the funds spent in his salary. He also can, if derelict, cost in value much more than the money he is paid.

THE INSPECTION FUNCTION

In its simplest form, inspection is observation. The inspector must see and determine whether or not the project is delivered and paid for according to contract.

The architect's plans depict what he believes to be the owner's desire. The contractor may interpret the architect's plans and specifications and the school district's contract a little differently than the architect depicts the owner's desire. In turn, each subcontractor, superintendent, foreman and mechanic interprets his work in the light of his ability, his experience and his own interest.

The duty of the inspector is to sometimes act as interpreter or referee. He must determine what is needed to clarify any misunderstanding and secure the proper contract modifications where demanded by equity. The inspector's ability to accomplish this ahead of the work and in such a way as to create no delays, no interference with work and without offense to anyone is most important.

The inspector does not do the other persons's work, nor the architect's and certainly not the contractor's. He merely helps to secure a project that he can certify as conforming to plans, specifications and change orders.

The general contractor (with his subcontractors) is required to provide proper material, supervision and workmanship as outlined in the contract documents. Do not accept any part of the general contractor's responsibility, nor the supervision and correlation of subcontractors because such responsibility is the general contractor's. Any reference to the subcontractor's work should be handled through the general contractor.

The responsibility for design, descriptions, qualities of material, fulfillment of the owner's desires, etc., rests with the assigned architect. He may employ engineering consultants such as structural, mechanical and electrical, but he is still responsible to the owner if their work is included in his contract.

The state planning board is responsible for certain phases of the project, particularly during the planning phase, but in all cases their criticisms and recommendations should be channeled through the architect.

The inspector's position is to observe and report. The inspector must be familiar with all plans and specifications relating to his assigned project. If possible, he should know how each independent segment of construction will affect those that follow. He should observe that initial work is done first and that the day's work does not destroy previous work nor make future work impossible. Corrections are costly and not as good as proper work in the first place.

PUBLIC RELATIONS

The standards of public relations that the inspector establishes with the contractor and his employees are of vital importance to the effectiveness of his work on the job. The contractor wants the job to go smoothly and as fast as possible and without interruptions. The inspector is also interested in uninterrupted production, but he is further delegated the responsibility of seeing that it meets the code and that workmanship and quality are maintained. Much that the inspector may accomplish depends on the attitude with which he regards the contractor and his employees and the respect which he, in turn, receives from them.

The inspector's greatest assets are the sincerity, purposefulness and effectiveness with which he does his work. He can best convince the contractor of his ability and integrity by knowing his inspection job thoroughly and by so doing it in a businesslike manner. A contractor or his representative who has successfully built other projects may be surprised when an inspector is able to discern some plan discrepancies wherein architectural does not agree with structural or mechanical and the point is finally cleared by typical sections and subcontractor's shop drawings. If the inspector, speaking without thorough knowledge of an involved situation, were to make an ill-founded or ill-timed suggestion, the fact would be immediately apparent to the contractor who gets the impression this inspector doesn't know the score and he could be readily deceived. If you don't know the answer, admit it, and let him know you will get the answer as soon as possible. You can't win them all, but keep trying. If the contractor or his representative has never built a school before, insist that they become thoroughly familiar with the plans and specifications and the District's concept of acceptable standards of material and workmanship.

While the inspector should always be watchful for poor workmanship and unapproved material, he must not, without positive proof, consider such discrepancies as a judgment against the contractor's integrity. The best results are obtained when minimum friction exists between the inspector and the contractor. An inspector must be impartial in his action and judgment, render prompt decisions and be a good listener to the opinions of others. He shall refrain from accepting gratuities or favors, nor place himself under obligation to the contractor.

CONCLUSION

Additional duties of inspectors include the preparation of correspondence and compiling of reports, daily log, progress reports, progress payments, change orders, shop drawings, architect's correspondence, work percentage charts, as-built drawings, etc. The inspector's office is indeed the clearing house for all problems in construction.

It is hoped that the principles set forth in this manual are a stimulation to those involved in the inspection function.

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SECTION 1

Job Appointment

Appointment of an inspector is made by the Director of Construction from eligibility lists established by the District's Personnel Division.

The inspector is a District employee and is subject to applicable rules and regulations. Reference should be made to the Classified Personnel Handbook for policy rules and regulations governing employment in the District.

JOB DESCRIPTION

Construction Inspector

DEFINITION

Performs continuous inspection of all types of contract school construction to insure compliance with plans, specifications and contract documents.

TYPICAL DUTIES

Represents the School District on the construction site in contacts with contractors, architects and the public.

Analyzes plans, specifications and contract documents.

Performs continuous inspection of frame, reinforced concrete, gunite, masonry, structural steel and other related phases of building construction to insure that all work complies with plans and specifications, contract documents and all applicable state and local building codes, ordinances and regulations.

Interprets or secures interpretations of plans and specifications for contractors and subcontractors.

Performs concrete and masonry tests.

Performs or supervises other tests as may be required.

Notifies commissioned architects, engineers and the appropriate persons in the School District of any material or workmanship which does not meet specifications.

Coordinates the work of specialized inspectors on the construction site.

Maintains a log of construction progress.

Prepares progress reports.

Performs related duties as assigned.

DISTINGUISHING CHARACTERISTICS

The Senior Inspector supervises and coordinates the work of construction inspectors and special inspectors on contract school projects within an assigned area, conducts final inspections and verifies compliance with state and local requirements.

A Construction Inspector represents the School District at construction sites; performs continuous inspection of construction materials, methods and workmanship; coordinates special inspections and checks for compliance with plans, specifications and regulations.

A special inspector, such as a Heating, Plumbing, Hardware or Painting Inspector, checks contractors' work in his specialty, without responsibility for general inspection.

CLASS QUALIFICATIONS

Knowledge of:

Building codes, ordinances and regulations of state and local jurisdictions.

Pertinent safety orders of the Division of Industrial Safety of the State of Nevada.

Methods of construction for masonry, structural steel, timber, concrete and reinforced concrete buildings and foundations.

Inspection methods and their practical application.

Building trade terminology.

Ability to:

Read and interpret building plans and specifications.

Detect deviations from the plans and specifications.

Detect inferior materials and poor workmanship.

Prepare concrete test cylinders and grout blocks.

Make slump tests.

Keep accurate records.

Make clear and concise reports.

Work harmoniously with commissioned architects, engineers, contractors, school personnel and the public.

ENTRANCE QUALIFICATIONS

Education:

Graduation from high school or its equivalent.

Experience:

(1) Construction Inspectors need to have as much, if not more, knowledge about building construction generally than do the contractor's superintendents and foremen whose work they must inspect and approve continuously and by whom they are frequently consulted.

(2) Construction Inspectors should have a minimum of five years of experience in the construction field, including two years as a superintendent, foreman, or inspector of building construction. They are also required to have adequate experience in reinforced concrete, masonry and welding.

(3) The required knowledge, skill and ability are acquired, primarily through experience in the building industry as a journeyman mechanic, a foreman and a job superintendent.

(4) Training in engineering or architecture in a recognized college or university may be substituted on a year-for-year basis for the non-supervisory and non-inspectional experience.

Application:

The inspector equipped with all this knowledge is just partially qualified. He must also have the capacity to use them. He must have:

1. Common sense
2. Patience

3. Understanding

4. The ability to translate thought into the other person's mind regardless of the other person's training (talk the man's language)

5. The courage to accept responsibility

6. Positiveness (say yes or no and mean it)

7. Integrity (be honest and fair)

The inspector equipped with all this knowledge and all these virtues still must put them to use. Their value is increased if good judgment allows them to be used positively rather than negatively.

Special:

A valid Nevada motor vehicle operator's license.

A private automobile.

SECTION II

Inspector's Code of Ethics

The building inspector occupies a position of trust and responsibility. The success of the school construction program depends a good deal upon the manner in which the building inspector discharges his duties. The opinion and attitude of the public towards the District will, to a large extent, depend upon the just, impartial and unprejudiced attitude of the building inspectors and the manner in which they conduct themselves.

The biggest single job in life is getting along with people. Public relations and communicating are vital tools to your success.

This section is intended as a guide to personal conduct.

1. Do not solicit or accept a loan, gift, or gratuity, either directly or indirectly, from any individual, company or corporation that is in any way responsible for compliance with the terms and conditions of the construction contract or any subcontract thereunder.

2. Do not use narcotics or intoxicating liquors or beverages while on duty nor appear on duty while under their influence.

3. Do not gamble or make any wager with any individual or party directly or indirectly concerned with the contract.

4. At all times adhere to a strict moral code and require similar conduct from all other parties at the job site.

5. Endeavor to maintain a high standard of personal relationships with all business associates, the general public and School District personnel. Build goodwill. Work at it. People will do more for you because they want to rather than if you try compulsion.

6. Apply yourself diligently to the performance of your duties. Endeavor to increase individual ability and knowledge at all times by being constantly alert for further self-improvement.

7. Refrain from suggesting or recommending to any contractor or subcontractor any of the following:

    a. any person for employment

    b. the purchase or use of any specific or manufactured product

    c. subcontracting to any individual or firm of any portion of the work included in the contract

8. Be sure everyone knows what is required before they do their work. There should be a meeting of architect, owner, engineers, contractor and principal subs before work starts, at which an agreement is reached concerning the basic status of the job.

9. Review the plans and specs with the contractor's superintendent and the sub's foreman before the work is started to be sure they are familiar with the requirements. Contact the architect and request his help in complete understanding of the plans. Ask for help in finding what may be left out. Sometimes costly omissions are corrected before they affect the cost. Whenever possible, anticipate problems and obtain advice and decisions concerning items which seem faulty or controversial or which might cause undue expense or delay in the construction. Do not procrastinate, but rather, take immediate action against violations, negligence and evidence of bad faith and fraud.

10. Exercise good judgment in administering your assigned duties and impose no unjust or unreasonable demands upon the contractor. Always be a good listener. Hear the other person out; be sure you understand his thought. If he has a gripe, usually he is satisfied when he gets rid of the steam and will be happy to do what he knew he had to anyway.

11. Do your utmost to obtain and encourage first-class workmanship. The reputation of the architect and the owner are largely in your hands and that reputation can affect the cost of future projects, which could be more than the combined cost of architects, engineers and inspectors. Further, the satisfaction with the project is influenced greatly by you and your ability to make them realize that they should be proud of the finished product that they secured for the public with public funds.

There are many books and bulletins on Public Relations. Recommended reading is "The Unwritten Laws of Engineering" by Professor W. J. King of the University of California. He came up with "The Ten Commandments of Getting Along with People".

1. Cultivate the tendency to appreciate the good qualities rather than the shortcomings of each individual. (Remember the fact that the superintendent and foremen are doing a good job, although their attitude toward you may be one of indifference.)

2. Do not give vent to impatience and annoyance on slight provocation. (The test of good manners is to be able to put up pleasantly with the bad ones.)

3. Do not harbor grudges after disagreements involving honest differences of opinion. (Many a man complains he is being made a fool of when he is only being exposed.)

4. Form the habit of considering the feelings and interests of others. (The easiest way to make a mountain out of a molehill is to add a little dirt.)
5. Do not become unduly preoccupied with your own selfish interests. (Don't be an eager beaver in showing your authority.)
6. Make it a rule to help the other fellow whenever an opportunity arises. (There is no better exercise for the heart than reaching down and lifting someone up.)
7. Be particularly careful to be fair on all occasions. (Get all the details, think well, decide wisely.)
8. Do not take yourself too seriously. (Don't assume responsibilities beyone your limitations.)
9. Put yourself out a little to be genuinely cordial in greeting people. (When you say "Good Morning", say it as if you were loaded with catnip.)
10. Give the other fellow the benefit of the doubt if you are inclined to suspect his motives, especially when you can afford to do so. (Never win an argument; just help him discover the correct side.)

Patience and understanding are indeed virtues.

SECTION III

General Outline of Inspector's Procedures

A. **Preliminary Duties**

1. The inspector shall not engage in any other occupation which will interfere with the proper performance of his inspection duties.

2. As there is an amount of paper work and reports to be initiated and maintained by the inspector, reference is hereby given to Section VII of the Handbook where all information pertinent to reports and records is itemized. All data is to be kept complete and up-to-date in legible form and properly filed. These record files shall contain all job correspondence, testing reports, finish and color selections, change order proposals, authorized change orders and any other data having reference to the project. The inspector shall also maintain a log of job events and progress.

3. It is important to bear in mind that the inspector is the field representative of the School District and also the State Planning Board and must help to maintain satisfactory conditions and relations as such. Under no circumstances should he place himself or let himself be placed in the position of making decisions or of giving interpretations which are beyond the scope of his authority or which alter the contract workmanship, materials or conditions. This is the duty of the architect and should be handled through him in each and every instance.

4. Generally speaking, the following are three types of work to be considered in personal verification of compliance with all applicable codes and the contract documents:

   a. Work that does not require continuous inspection due to the fact that all portions will be open and/or accessible long enough to check any and all items or portions of work installed.

   b. Work that does require continuous inspection during placement, such as concrete pouring operations, masonry, roofing, etc. If the inspector has more than one job assignment which requires continuous inspection during any given period, he should request assistance from a fellow inspector prior to performance of his work.

   c. Work which must be inspected by specially qualified and appointed inspectors. These men will have complete control of and responsibility for certain specialized installations and/or operations, such as welding, structural masonry, glued laminated lumber, structural steel fabrication, etc. When job conditions warrant, such special inspections, when called for, may be waived by the architect with the consent of the Director of Construction. In this case, the regular job inspector may be used for such inspection.

Offsite inspection (streets, sidewalks, street lights, etc.) shall be as requested of the city or county within whose boundaries said construction is taking place.

5. The duties of inspector also involve safeguarding the District's interests against a variety of contingencies without exposing the District to charges and possible claims for interference or delay.

   a. The discovery of error or elements overlooked in the final drawings or specifications and their early correction.

      There is an additional burden which falls on the inspector because "we know what we want". The District's large volume of operation permits savings through standardization in both educational and plant maintenance requirements. Accordingly, standards for design, materials and workmanship are developed which will keep maintenance costs to a minimum. The District's specifications standards provide a means to take a close look at plans and specifications to detect omissions and variations from standards in advance so that necessary changes can be made at minimum cost. It means close inspection for quality in materials, equipment and construction.

   b. The prevention of error which might result in unnecessary and costly maintenance and upkeep costs.

   c. The avoidance of "extra" construction costs beyond the approved construction contracts.

6. The inspector shall assist in the enforcement of all applicable codes and orders of the State Division of Industrial Safety and shall cooperate with the local representative in reporting flagrant and repeated violations.

B. Construction Project Duties

1. The inspector shall have access to all pertinent contract information. He shall procure and familiarize himself with the contract drawings and specifications.

2. When construction work is being done on existing school sites, brief the school principal on the scope of the job (schedules, safety barricades, delivery routes). Become aware of his problems and acquaint him with your problems. If necessary, personnel from the Department of School Planning can assist in your contact with the principal.

3. Establish a meeting with the architect and contractor at the job site in order to locate construction offices, define barricade areas, outline delivery routes, if necessary, and arrange for immediate toilet facilities.

This preliminary meeting can also be utilized to obtain the contractor's progress schedule and review with the contractor the required submittals from his office. No subcontractor shall work on the project unless the subletting of the work has been approved. A copy of the original list of subcontractors will be furnished at the start of the project.

4. This is the proper time to start recording job log which is to be kept up-to-date until job completion and District final acceptance. Log make-up and entries are optional as to form, but should include information on orders or interpretations given or received, weather conditions, site visitations by others, general job progress, accidents and any other unusual occurrences.

5. Upon completion of the field office, it is advisable to set up an adequate file system for forthcoming records and forms. This is the time to procure blue-line drawings from the staff architect's office for required "as-built" drawings. During this relatively free period, you should procure concrete cylinder test cans and a slump cone and tamping rod.

6. The inspector shall not deal with any subcontractor, material supplier, or workman except with the full knowledge and consent of the contractor or his representative. Although the inspector has no authority, nor is he expected to coordinate the job for the contractor, it is within his jurisdiction to call to the attention of the contractor's representative contract time elements and insufficient manpower or material deliveries. This fact should also be included in his semi-monthly reports.

7. Temporary electrical service must be inspected by District electrical inspector prior to request for service. When job telephone facilities are provided, notify architect and Director of Construction of the number.

8. The inspector shall give special attention to the terms and conditions relative to testing materials. If other tests should be deemed necessary by the inspector, he should contact the Director of Construction for authority to proceed. If any tests do not meet requirements, refer the matter to the Director of Construction and the architect for decision and instructions.

9. The inspector shall maintain an accurate record of concrete pouring operations as required. The inspector must make concrete slump tests; he must prepare and submit to the testing laboratory the concrete cylinders, grout prisms and mortar cups. When required, he shall procure and submit samples of reinforcing steel, A.C. paving and roofing as directed.

10. The inspector shall permit no unauthorized substitution of materials. He shall require for every material delivery not covered by a specific testing laboratory report or other means of identification, a notarized letter or certificate in triplicate from the vendor stating that said material complies in all respects with the contract documents and/or applicable codes. The inspector shall promptly deliver copies to the architect and Director of Construction to obtain required clearances.

11. If at any time workmanship or materials are judged faulty, do not take it upon yourself to destroy or damage same. Verbal or written condemnation is all that is necessary.

12. If architect orders work which you know is contrary to District policy or not in the best interest of the District, notify the Director of Construction.

13. Change order proposals (contract time extension, work changes, new work, etc.) may be directed to you for verification and comment.

14. The inspector shall remind the contractor's representative as frequently as is necessary to comply with the contract specifications regarding job clean-up as work progresses.

15. Dust preventative measures shall be observed throughout the course of construction, as should the acquisition of required burning permits and inspections for sewer connections, street improvements, etc.

16. Labor union representatives may visit your construction project. Gentlemanly conduct is to be expected of all parties involved.

17. If architect should refuse or neglect to give a written order on clarifications or interpretations, record the verbal order in your log and/or via A.V.O. form (See Section VII).

18. Throughout the job progress, the inspector shall assist the Senior Inspector to notify all parties concerned and coordinate all specialized inspections (including all District plumbing, heating, hardware and electrical inspections) at least 24 hours in advance. He shall maintain a record of these inspections on forms provided (See Section VII). Near the time of project completion, the Senior Inspector shall coordinate all required final specialized inspections, make his own minute inspections, see that all discrepancy items are corrected in a satisfactory manner, be sure that all paper work is duly processed (See Section VII) and see that "as-built" drawings are delivered to the architect before establishing the time for final acceptance inspection with the architect and Director of Construction.

19. The Department of Supplies and Equipment is responsible in seeing that new facilities are adequately and systematically provided with instructional and accessory equipment in time for use. Although delivery schedules are usually set for dates after the scheduled construction completion date, early deliveries or construction delays may require inspection and acceptance of certain areas that can provide a secured storage of such delivered items.

    Delivery routes shall be located where there is a minimum of interference with the construction process. In order to absolve the contractor of any responsibility, any damage as a result of these deliveries or bulk shipments shall be duly recorded.

SECTION IV

Inspection Procedures By Specification Sections

2B Earthwork and Grading

1. If contract involves earth moving, compliance with architect's plans and specifications for soil suitability and compaction tests is required. If caliche is present, see that it is removed from area to a depth below design depth of footings and that it is not used for fill. If there is any doubt that any area is of questionable compaction, call for a density test from the testing laboratory. All densities must meet design specifications. If soils are of the nature to absorb and swell, such as various clays, have test made to minimize the possibility of swelling by induction of moisture into a highly compacted fill. The percentage of compaction may in some cases have to be reduced in order to avoid future upheaval, resulting in undue stresses and cracks in structural concrete and slabs on grade.

2. On other than controlled fill, the inspector shall verify the complete grading operation giving special attention to adequate brushing, required benching, optimum moisture, depth of lift placements, correct gradients, embankment locations, slopes and compaction.

3. If survey party should encounter any discrepancy or topography error in their work, notify architect immediately for a decision on how to proceed.

4. Check anticipated method of excavation and forming for code and contract compliance.

5. Upon completion of footing excavations, notify architect so that he may inspect and approve bearing soil condition.

6. Backfilling of foundation trenches, fuel tank excavations, utility trenches, etc., must be carefully watched to see that required compaction is being obtained with the specified materials.

7. Surfacing soils approvals and placement shall be in complete accord with plans and specifications. In areas which are scheduled to receive topsoil, notify District's landscape inspector after uniform clean subgrade has been established and a sample load of topsoil has been received. After obtaining approval, maintain representative load for future comparisons. On large projects where a hardship would be imposed on the contractor by delaying soil placement until all areas are properly prepared, partial placements may be made if the contractor so requests.

8. Grading "as-builts" are of extreme importance and must be maintained according to directives and specification requirements. These completed and certified drawings shall be delivered to the architect prior to final inspection to allow time to spot check grades and gradients.

2C Asphaltic Concrete Paving

1. The first consideration that should be given this installation is the fact that only asphaltic concrete pavement is only as good as the base and prepared sub-grade. Consequently, the inspector shall make certain of proper soil conditions before allowing paving operation to proceed. Close supervision should be given to materials delivered to be sure that mix is in compliance with specifications. If in doubt of compliance, procure a test can sample for extraction test to be performed by the authorized testing laboratory after approval by the Director of Construction. On large paved areas use of a mechanical spreader and tamper is specified and shall be enforced; normally, hand laying is permitted in small localized areas. Adequate rolling and cross rolling shall be performed to remove irregular joints and to insure proper specific density of the wearing surface. Tacking to adjacent installations shall be conscientiously performed. Prior to application of the specified seal coat, the entire paved surfaces shall be flooded, allowed to drain and the resultant depressions and irregularities marked and patched; drainage test must be performed in the presence of the inspector. Follow through with adequate inspection of specified seal coat application and cleanup.

2F Fencing

1. If fencing plot plan should be small scale, obscure, or not clear, the inspector shall consult the architect for definite locations. "As-Built" grading drawings require fence locations which should be clearly shown in relation to buildings, embankments, etc. All materials shall be checked for specification compliance, including pipe, concrete, fabric, fittings, tension wires, tension bars and affiliated hardware. Fence installation shall be plumb and properly aligned with tension wires and fabric stretched taut. Normally, adjacent to property lines, it is a District policy to maintain center line of fence on school property by a minimum of 6". All hardware and fittings shall be sufficiently attached and tightened to prohibit removal without the use of tools. Specified ground clearance shall be observed as closely as possible. All gates shall be checked for operation and latching operation in the completed fence.

3A Concrete

1. Refer to specifications for required mix designs and enforce compliance throughout all concrete pouring operations on the project. Design mixes should not be altered. Under no circumstances shall admixtures be added to established mix design without authorization of the architect.

2. Prior to any pour investigate to see that contractor has adequate equipment and labor to handle pour in a satisfactory manner.

3. On structural pours permitting bonded weighmaster, keep adequate information, such as time of delivery, time of batching, truck number as the pour progresses. This information must be properly recorded on the "Daily Record of Pour" form (See Section VII) and kept up-to-date for distribution at close of job.

4. Upon arrival of concrete at job site when transit-mixed concrete is used, preparations should have been made by the inspector for comparison of mix design to truck delivery slips or plant inspector's certificate. It is advisable to have slump cone and test cans at location of pour as the required mix adjustment (water) will be determined at this time by establishing slump.

5. During pouring operations the inspector shall see that all concrete placement is proper regarding spading or vibration, cold joints, etc.

6. Use care in preparing, handling and storing required test cylinders as they are representative samples of the structural concrete being placed. Delivery to the testing laboratory of the test cylinders will be made by the inspector after proper interval of job storage. Delivery must be accompanied by proper form (See Section VII).

7. If a cold joint will occur between pours in vertical sections, the contractor must prepare a suitable joint while the concrete is green or he must resort to sandblasting prior to the next pour. The type of joint shall be as directed by the architect.

8. Specified curing schedule must be observed, including weekend and holiday periods and it is the inspector's duty to personally observe this operation by making definite curing appointments with the contractor's representative.

   Whereas prepared chemical curing compounds are generally satisfactory for flatwork, water cure must be used on footing, foundations walls, columns and other similar types of structural pours. See that concrete surfaces are properly water cured for the specified period of time, to reduce the possibility of surface cracks usually caused by too rapid dehydration.

9. Insist that concrete contractor set sufficient screeds to maintain a proper grade; grade stakes or pegs never result in a true plane. After concrete has been rodded to a true plane, watch to see that sufficient tamping is performed to bring fat to the surface and imbed all course aggregate below the surface so that it does not interfere with troweling.

10. All exterior flatwork shall be installed to slope to drain. If this condition does not exist, notify architect.

11. Abrasive applied to steps and ramps must be properly applied, not loosely on surface or trowelled in so that the nonslip purpose is defeated.

12. A record showing the location that concrete was poured shall be indicated in your log.

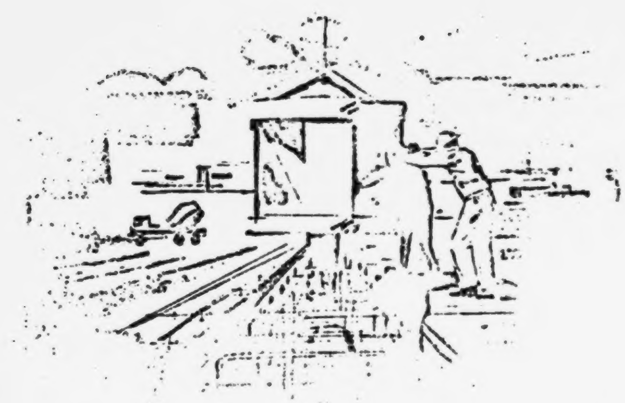
13. The quality of concrete depends largely on workmanship and construction. The best materials and design are not effective unless the construction is well performed. High cylinder strength does not insure good concrete in place. All factors as covered in the Uniform Building Code, the specifications and what is considered good concrete practice in the industry are equally important.

14. Shavings, dirt and debris should be clear of all formed areas to receive concrete.

15. Check for required slab elevation changes or depressions in slabs such as receiving ceramic tile, entrance mats, urinals or other equipment.

CONCRETE TOPIC

Presented by:



Permanente Cement Company—Technical Service Dept. Bulletin No. 12-A

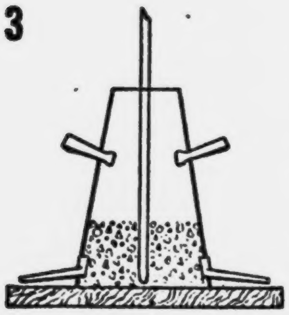
FIELD TESTING

Slump Test Procedure

1 To obtain a representative sample, take samples from three or more regular intervals throughout the discharge of the mixer or truck. DO NOT take samples at the beginning or the end of the discharge.

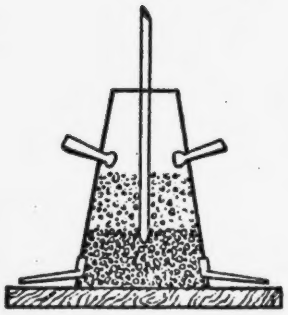
2 Dampen inside of cone and place it on a smooth, moist, non-absorbent, level surface large enough to accommodate both the slumped concrete and the slump cone. Stand on foot pieces throughout the test procedure to hold the cone firmly in place.

3



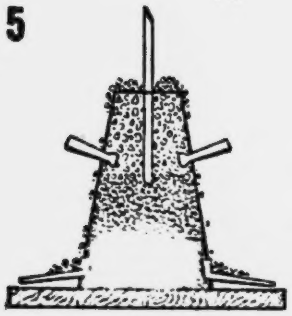
Fill cone ⅓ full by volume and rod 25 times with ⅝-inch-diameter x 24-inch-long bullet-pointed steel rod. (This is a specification requirement which will produce non-standard results unless followed exactly.) Distribute rodding evenly over the entire cross section of the sample.

4



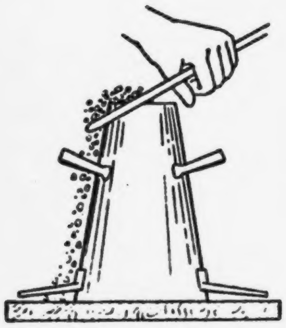
Fill cone ⅔ full by volume. Rod this layer 25 times with rod penetrating into, but not through, first layer. Distribute rodding evenly over the entire cross section of the layer.

5



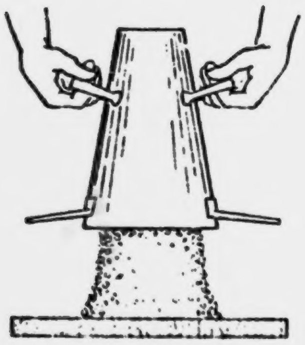
Fill cone to overflowing. Rod this layer 25 times with rod penetrating into, but not through, second layer. Distribute rodding evenly over the entire cross section of this layer.

6



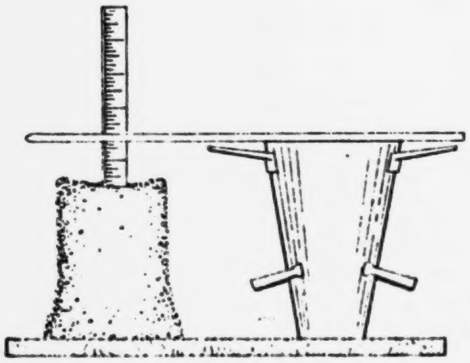
Remove the excess concrete from the top of the cone, using tamping rod as a screed. Clean overflow from base of cone.

7



Lift cone vertically with slow, even motion. Do not jar the concrete or tilt the cone during this process. Invert the withdrawn cone, and place next to, but not touching the slumped concrete.

8



Lay a straight edge across the top of the slump cone. Measure the amount of slump in inches from the bottom of the straight edge to the top of the slumped concrete at a point over the original center of the base. The slump operation shall be completed in a maximum elapsed time of 1½ minutes. Discard concrete, DO NOT use in any other tests.

TURN CARD FOR CYLINDER CASTING PROCEDURE ▷

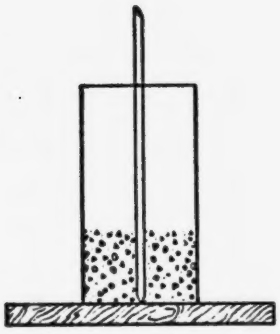
Cylinder Casting Procedure

Test cylinders are prepared in the field for one of two purposes: a) To check the adequacy of the laboratory design for strength, or as a basis for acceptance. b) To determine when a structure may be put into service. These two evaluations require very different curing conditions. See ASTM Specification C 31.

1 Use only non-absorptive molds. Metal or paraffined paper molds, 6" in diameter x 12" in length, with metal bottoms, are used for casting concrete cylinders in the field. THREE cylinders should be cast for each age period of test.

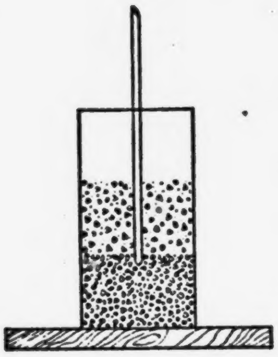
2 To obtain a representative sample, take samples from three or more regular intervals throughout the discharge of the mixer or truck. DO NOT take samples at the beginning or the end of the discharge.

3



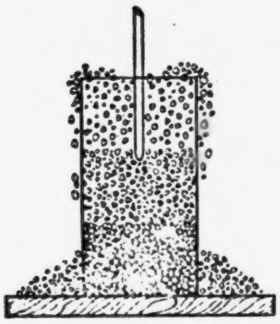
Place cylinders on a smooth, level surface in a protected area where temperature can be maintained between 60°F. and 80°F. Fill each cylinder ⅓ full and rod 25 times with ⅝-inch-diameter x 24-inch-long bullet-pointed steel rod. (This is a specification requirement which will produce non-standard results unless followed exactly.) Distribute rodding evenly over the entire cross section of the sample.

4



Fill cylinders ⅔ full. Rod this layer 25 times with rod penetrating into, but not through, first layer. Distribute rodding evenly over the entire cross section of the layer.

5



Fill cylinders to overflowing. Rod this layer 25 times with rod penetrating into, but not through, second layer. Distribute rodding evenly over the entire cross section of this layer.

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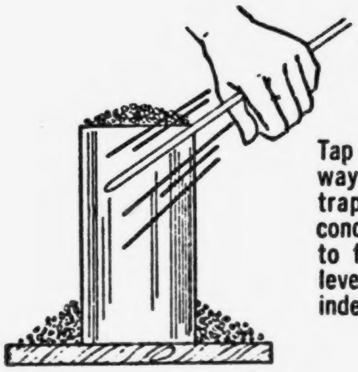
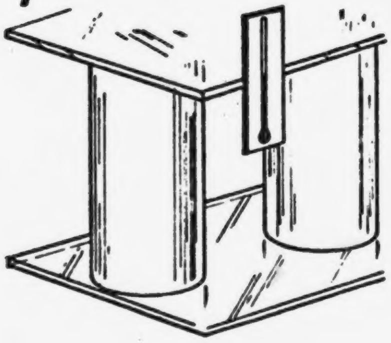


Tap cylinders lightly all the way around to remove entrapped air. Strike excess concrete from top of cylinders to form a smooth surface, level with the top of the cylinders. Identify each cylinder.

7



Cover tops of cylinders with a glass or metal plate or friction-type lid to prevent loss of moisture. Protect cylinders from temperatures over 80°F. and under 60°F. for 24 hours. (Exposure to hot sun or low temperature will give non-standard results.)

8

When cylinders are made and tested to check adequacy of the laboratory design for strength, or as the basis for acceptance, specimens must be removed from the molds at the end of 24 hours. Storage in a moist condition (free water on the surface at all times) and at a temperature of 73.4°F. ± 3.0°F. must be maintained until the time of the test. A laboratory must be used to attain these curing conditions.

When transporting cylinders to the laboratory, do not permit cylinders to rattle in a box in the back of a car or in the bed of a pick-up truck. Use standard cylinder traveling case placed on a foam rubber mat.

Identification labels should include the following information:

Identification number of cylinder____________

Date made____________Made by____________

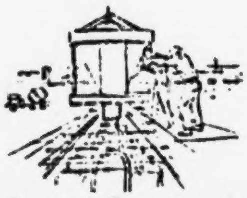
Slump of concrete______Spec. strength of concrete______

Structure of member represented____________

Age to be tested____________

NOTE: For further details, see ASTM Specifications: C 31, C 143, and C 172.

CONCRETE TOPICS



Published by Permanente Cement Company to provide the end user o
ready mixed concrete with helpful pointers on good concreting practices.

Testing concrete– How to avoid erratic results

Poor testing procedures can cause more trouble than poor concrete–especially if the tester can't tell whether the test or the concrete is at fault.

Always use accepted standards

Standard procedures were not developed so much to embarass the "short-cut" artist, as to establish lines of uniformity for architects, engineers and designers.

The ready-mix concrete producer's guarantee of strength is meaningful only if the specimens are tested according to accepted, reliable standards, such as those established by the American Society for Testing Materials.

8 steps to reliability

The most common way to test concrete strength is the 6 x 12 cylinder. Standard practice involves: 1. Sampling, 2. Rodding, 3. Strike off, 4. Job curing, 5. Transportation to the laboratory, 6. Laboratory moist room curing, 7. Capping, and 8. Compression testing.

Test results are useless if any of these important operations is performed incorrectly. However, the most frequent violation of good testing practice involves step No. 4–curing.

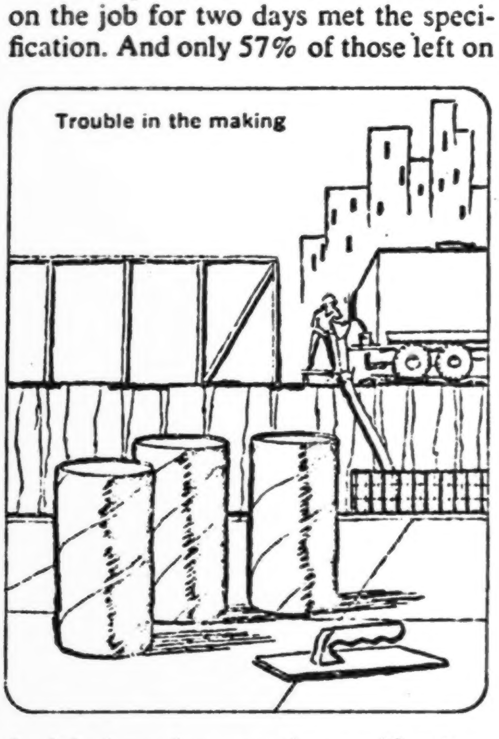
Improper cure is fatal

Even the most experienced men make mistakes. A recent job called for a concrete strength of 4000 psi. Concreting period extended from July through September. Over 300 test cylinders were prepared to check concrete being delivered to the job site.

Tests showed the average strength to be only 3976 psi–which was below the specification–and one of Alpha's field engineers was called in to analyze the cylinder results.

After failing to correlate the results with slump or air content, Alpha's man charted the *time cylinders were stored on the job in a curing box.* He came up with some shocking news: all the cylinders that were taken to the laboratory after *one day* on the job (in accordance with ASTM spec C-31-49) met the 4000-psi requirement with a reasonable margin of safety.

But only 62% of those that remained on the job for two days met the specification. And only 57% of those left on the job three days met the specification.



After six days on the job, none met the requirement (see chart).

Rectify mistakes before they happen

Good testing depends upon good teamwork–between the producer, the user and tester. Without it, the test is a meaningless–and often costly–waste of time.

Although temperature and humidity conditions may temporarily mask the effects of poor concrete curing on the actual job, the test cylinder is never fooled.

Days of Job-Site Curing	Average 28-Day Strength	Percentage of Cylinders Over 4000 psi
1 day	4360	100
2 days	4184	62
3 days	4047	57
4 days	3892	52
5 days	3849	45
6 days	3802	0

The job described above required over 100 man-hours, core drilling (a firm had to be brought from a distance of 50 miles), and swiss hammer testing before the problem was solved. It could have been avoided if:

(1) the cylinders had been allowed to stand only 12 to 24 hours with their tops covered (usually with glass),

(2) the temperature had been maintained between 60 and 80 F;

(3) the cylinders had been carefully packed in sawdust and shipped to a laboratory for compression testing.

Top third is weakest

Poor test practices make this "weakest link" even weaker. Take particular care because this area is especially susceptible to loss of strength through early drying.

hot weather concreting

KAISER CEMENT & GYPSUM CORPORATION

Concreting in hot weather poses some special problems. Among these are strength reduction and cracking of flat surfaces due to rapid drying. Concrete may stiffen before it can be consolidated because of rapid setting of the cement and excessive absorption and evaporation of mixing water. This leads to difficulty in the finishing of flat surfaces.

Most of these problems can be minimized by the following precautions:

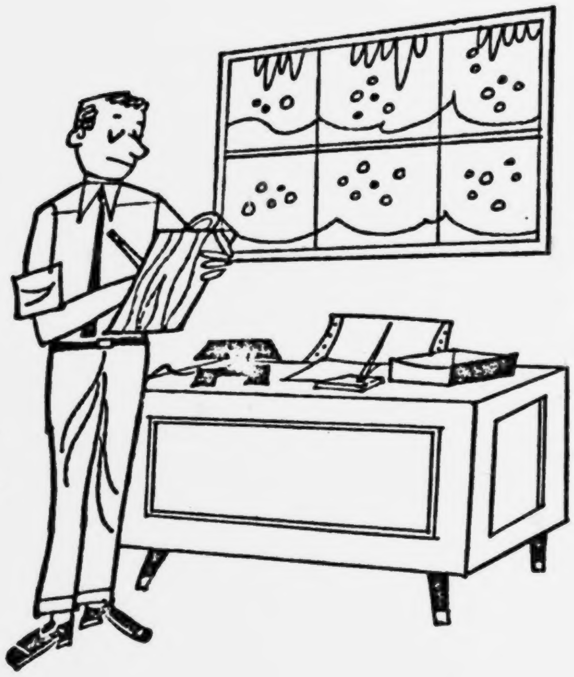
1 PLAN AHEAD

Be prepared with necessary equipment and material well in advance of hot weather.

Be sure of an ample water supply for sprinkling subgrades, wood forms and aggregates, and for curing.

Have tarpaulins or polyethylene sheets and lumber ready for sunshades and windbreaks.

Schedule work so that concrete can be placed with the least delay. Jobs could be started late in the afternoon during extremely hot periods.



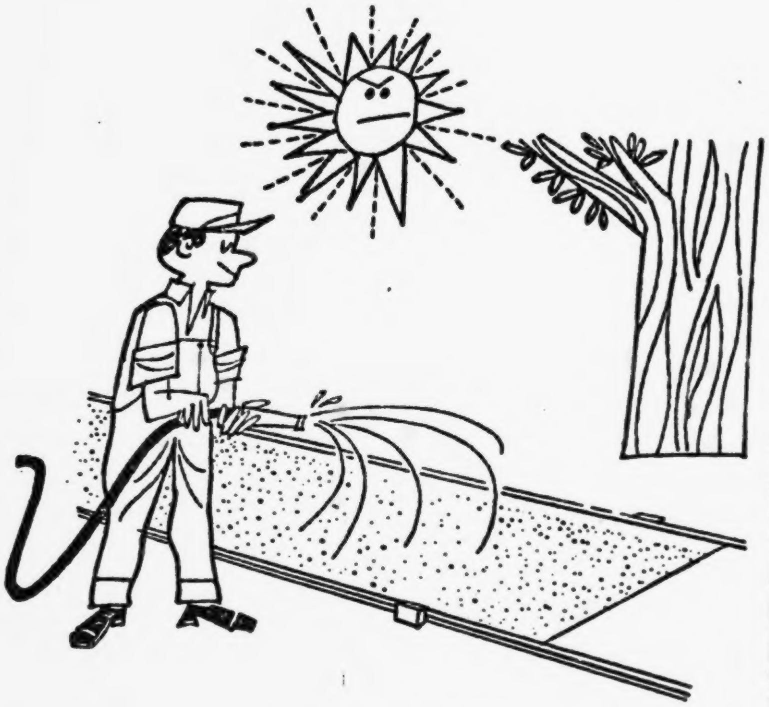
2 USE COOL MATERIALS

Use concrete which has been chilled during preparation. Stockpiles of coarse aggregate should be sprinkled with water to cool the aggregate by evaporation. Mixing water should be chilled in very hot weather by refrigeration or by using ice as part of mixing water. The ice should be melted by the time concrete leaves the mixer.

3 PREVENT ABSORPTION

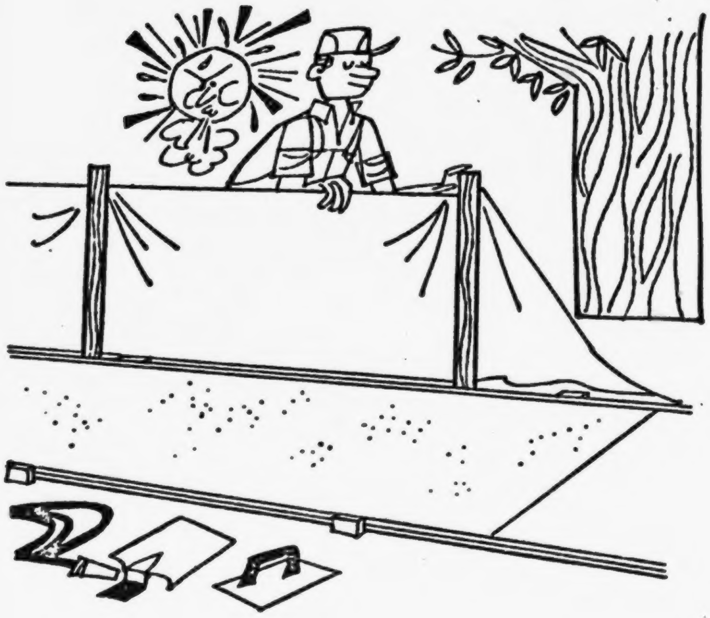
Sprinkle subgrade and wood forms just before placing concrete so they will not absorb water from the mix.

Coarse aggregates should be sprinkled before they are added to the batch.



4 PROTECT AGAINST EVAPORATION

Erect windbreaks to prevent strong, hot winds from drying exposed concrete flatwork surfaces while they are being finished.



5 PLACEMENT AND FINISHING

Don't delay in placing concrete. Strike it off and darby it at once.

Place temporary covers, such as burlap kept continuously wet, over the fresh concrete immediately after striking and darbying.

When ready for final finishing, uncover only a small section immediately ahead of the finishers. Cover again at once after final finish and keep the cover wet.

Any delays in finishing air-entrained concrete in hot weather usually lead to the formation of a rubber-like surface which is difficult to finish without leaving ripples or ridges.

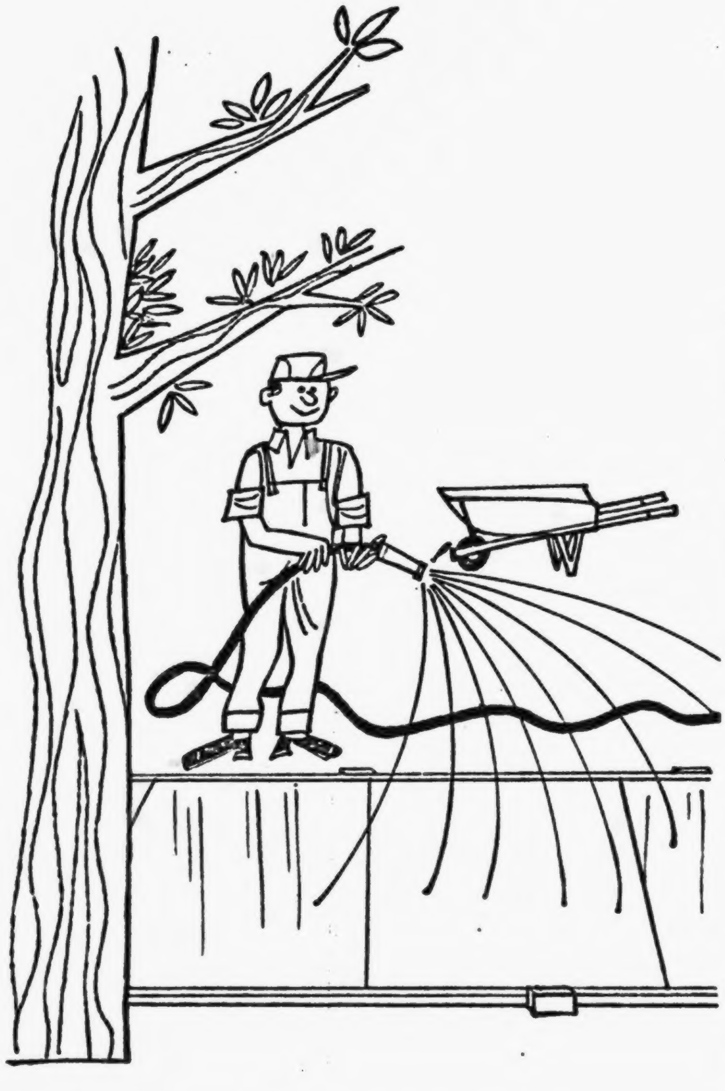
6 CURE IMMEDIATELY

Start curing as soon as surfaces are hard enough to resist marring.

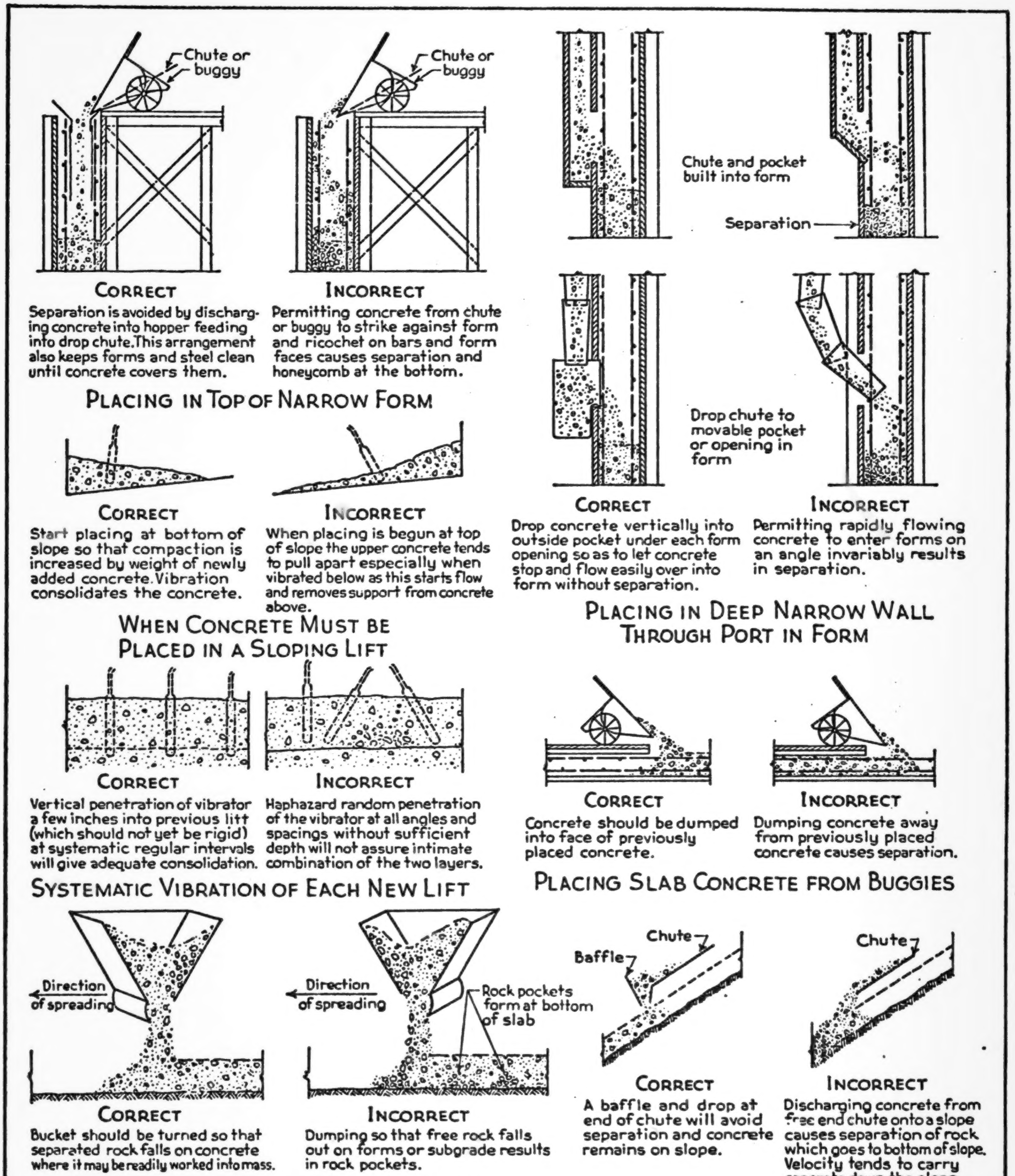
If curing compound is to be used, apply it immediately after final finishing. See that adequate and uniform coverage is obtained. In extremely hot weather it is advisable to cover the slab with water for 12 hours before using curing compound.

Keep the concrete surface *constantly* wet to avoid alternate wetting and drying during the curing period.

Continue curing for at least 7 days. Water not only acts as a curing agent but also cools the slab.



CORRECT & INCORRECT METHODS OF PLACING CONCRETE


Chute or buggy
Chute or buggy
Chute and pocket built into form
Separation
Drop chute to movable pocket or opening in form
Direction of spreading
Direction of spreading
Rock pockets form at bottom of slab
Chute
Baffle
Chute

CORRECT

Separation is avoided by discharging concrete into hopper feeding into drop chute. This arrangement also keeps forms and steel clean until concrete covers them.

INCORRECT

Permitting concrete from chute or buggy to strike against form and ricochet on bars and form faces causes separation and honeycomb at the bottom.

PLACING IN TOP OF NARROW FORM

CORRECT

Start placing at bottom of slope so that compaction is increased by weight of newly added concrete. Vibration consolidates the concrete.

INCORRECT

When placing is begun at top of slope the upper concrete tends to pull apart especially when vibrated below as this starts flow and removes support from concrete above.

WHEN CONCRETE MUST BE PLACED IN A SLOPING LIFT

CORRECT

Vertical penetration of vibrator a few inches into previous lift (which should not yet be rigid) at systematic regular intervals will give adequate consolidation.

INCORRECT

Haphazard random penetration of the vibrator at all angles and spacings without sufficient depth will not assure intimate combination of the two layers.

SYSTEMATIC VIBRATION OF EACH NEW LIFT

CORRECT

Bucket should be turned so that separated rock falls on concrete where it may be readily worked into mass.

INCORRECT

Dumping so that free rock falls out on forms or subgrade results in rock pockets.

IF SEPARATION HAS NOT BEEN ELIMINATED IN FILLING PLACING BUCKETS

(A temporary expedient until correction has been made)

CORRECT

Drop concrete vertically into outside pocket under each form opening so as to let concrete stop and flow easily over into form without separation.

INCORRECT

Permitting rapidly flowing concrete to enter forms on an angle invariably results in separation.

PLACING IN DEEP NARROW WALL THROUGH PORT IN FORM

CORRECT

Concrete should be dumped into face of previously placed concrete.

INCORRECT

Dumping concrete away from previously placed concrete causes separation.

PLACING SLAB CONCRETE FROM BUGGIES

CORRECT

A baffle and drop at end of chute will avoid separation and concrete remains on slope.

INCORRECT

Discharging concrete from free end chute onto a slope causes separation of rock which goes to bottom of slope. Velocity tends to carry concrete down the slope.

PLACING CONCRETE ON A SLOPING SURFACE

Fig. 35. Correct and incorrect methods of placing concrete. Adapted from *Recommended Practice for Measuring, Mixing and Placing Concrete* (ACI 614-42) of the American Concrete Institute.

3B Forming and Reinforcing Steel

1. As previously mentioned, anticipated method of excavation and forming should be outlined to the inspector by the contractor's representative. Forms should comply with all plan details regarding size, shape, inserts and construction joints.

2. Examine all footing excavation thoroughly regarding lowering of footings, specified depths, legality of steps and required clearances. All chases and sleeves must be secured in place prior to concrete pour, as must all reinforcing steel, bolts, inserts, reglets, etc.

3. Excavated trenches and all forms should be dampened prior to and during pour as conditions warrant. Note curing listed hereinafter including dry pack.

4. Forms and screeds should be checked just prior to each pour in order to verify that placement is proper. Where concrete will be exposed, insist on smooth form surface free of blemishes and ridges.

5. Check placement of all bolts and inserts, giving special attention to bolt sizes and spacing. It is advisable to check special anchor bolts directly from the plans in the field.

6. Refer to specifications for required laboratory tests of reinforcing steel and permit no installation without required compliance.

7. Check reinforcing steel for placement, size, laps, clearances, rigidity of curtains, etc. A final check shall be given just prior to concrete pour to secure dislodged steel, sleeves and so forth.

8. Allow no alteration of reinforcing steel sizing or grading without authorization of the architect.

4A Masonry

1. Diligent inspection is required on all structural masonry, free-standing walls over five feet high and all retaining walls over four feet high. Regardless of whether the project installation of masonry comes within the preceding limitations, the inspector should always supervise the footing pours and verify the placement of vertical dowels for alignment with the forthcoming masonry installations. (Bending or kinking of bars to obtain alignment is not permissible.)

2. The following items are to be observed by the job inspector during masonry work:

   a. All required material test reports must be received prior to start of work.

   b. Contractor shall be responsible for initial section of wall to be erected and approved. This will be the representative sample.

   c. Mortar mixing times and sequences must be rigidly followed.

   d. If a single mixer is used, it must be washed clean between grout and mortar mixing. No split-sack mixes shall be used without weighing the cement.

   e. Reinforcing steel must be properly placed and secured.

   f. Grout must be poured by two-man teams, one pouring and one puddling immediately behind.

   g. Toothing is prohibited and racking must be kept to a minimum.

   h. Bricks must be cleaned of accumulated brick dust and wetted thoroughly prior to laying. Concrete blocks normally do not require wetting, except for curing.

   i. Vertical alignment of cells and courses must be perfect and unobstructed.

   j. Construction joints below top of masonry must be observed.

   k. Tempering of mortar by careful wetting on mortar boards will be permitted; however, grout or mortar which has been mixed but remains unused for one hour must be rejected. Mortar slump is to be maintained at 2-3/4" plus or minus 1/4".

   l. Foundation must be clean, level and at proper elevation before masonry installation is started.

m. Full width, unfurrowed bed joints and full shoved head joints must be observed during laying operations.

n. Curing as specified must be observed.

o. Grout prisms and mortar cups shall be prepared as specified or as required. These samples shall be delivered to the testing laboratory by the inspector accompanied by a form supplied by the laboratory.

p. Enforce rigid conformance with codes and contract documents on installations which are affixed to or built into masonry construction.

q. Reinforcement must be imbedded in grout not mortar.

r. Maximum height for grout pours for filled-cell construction is eight feet when using regular block and cleanout holes and 48" maximum without cleanout holes at all cells. For brickwork one tier may be carried up 12" but the other tier shall be grouted each 4".

MASONRY

1. TIME OF TESTING AND NUMBER OF SPECIMENS

At the beginning of all masonry work, three test specimens (one for 7 days and two for 28 days) of the mortar and grout shall be taken on each of three successive working days. Additional samples shall be taken whenever any change in materials or job conditions occur that make necessary the additional tests to determine the quality of the material.

2. METHOD OF SECURING SPECIMENS

A. Mortar Specimen

Test specimens for mortar are made of the mortar taken from the wall surface a minimum of one minute after it has been spread by the mason. Under this condition some of the water has been transferred from the mortar into the brick. In this way a test specimen of the mortar as it exists in the wall is obtained. The sample should never be taken from the mortar board. The test specimens are made in cylinders having a width-height ratio of 1 to 2, generally 2" in diameter and 4" high. These are prepared similar to concrete cylinders.

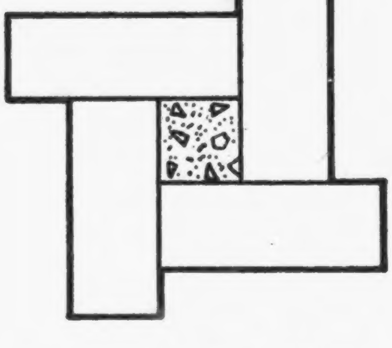
B. Grout Specimen

Test specimens for grout are made of the mix as it is discharged from the mixer, and placed in brick molds. A permeable paper or blotter separator should be placed between the brick and the grout so that the water may pass through the paper into the brick. The separator merely expedites the removal of the brick without damage to the grout specimen. The brick molds must be wetted, the grout puddled and treated in the same manner as the grout in the wall in order to obtain a specimen comparable to that in the wall. The test prisms shall have a width-height ratio of 1 to 2 and are generally 3" x 3" x 6".

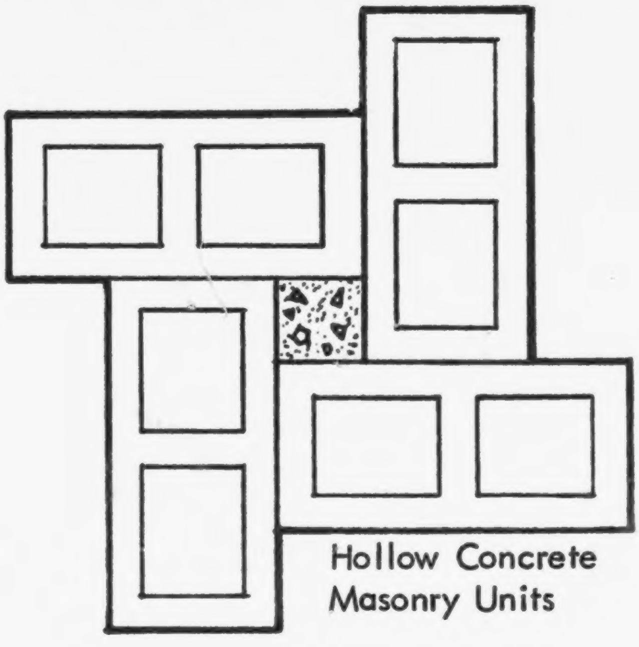
3. STORAGE AND CURING OF SPECIMENS

After molding, the mortar and grout specimens shall be carefully protected from evaporation and physical damage for at least 24 hours. Thereafter, they shall be removed to the laboratory to be stored and cured as required for concrete cylinders.

4. TYPICAL GROUT MOLDS

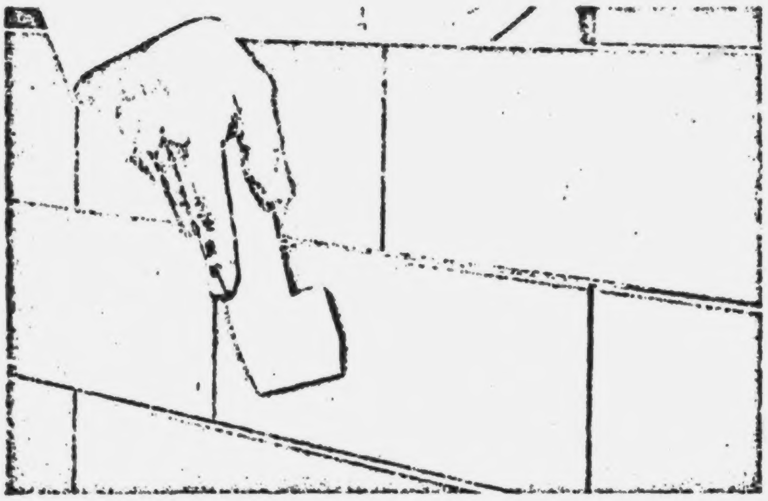


Clay Building Bricks

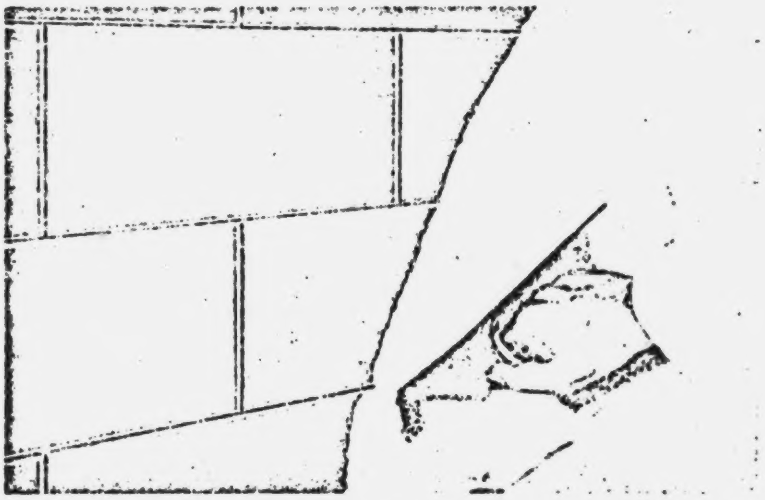


Hollow Concrete
Masonry Units

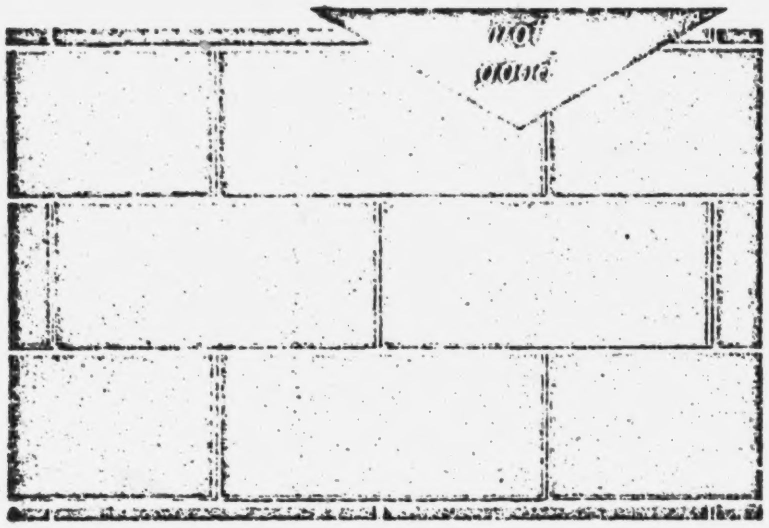
Essentials of good structural clay facing tile workmanship...



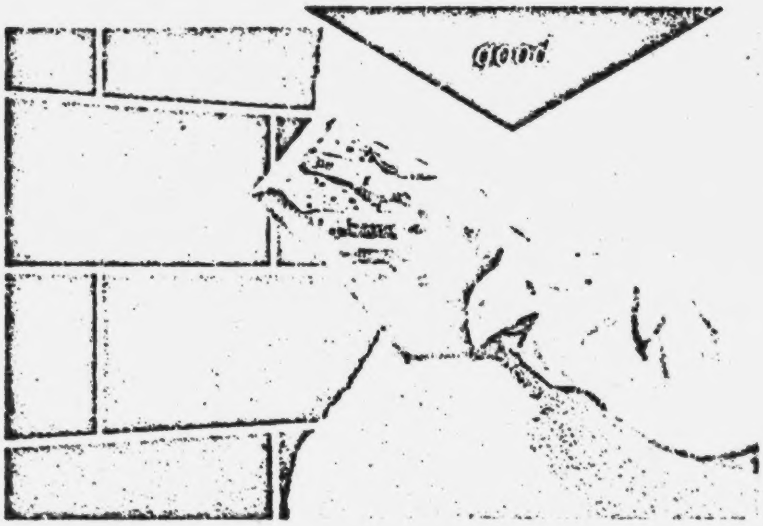
Rake out joints for pointing mortar before mortar sets up. Use a raking tool or wooden stick and rake clean to a depth of approximately ⅜". Wipe cement from tile edges.



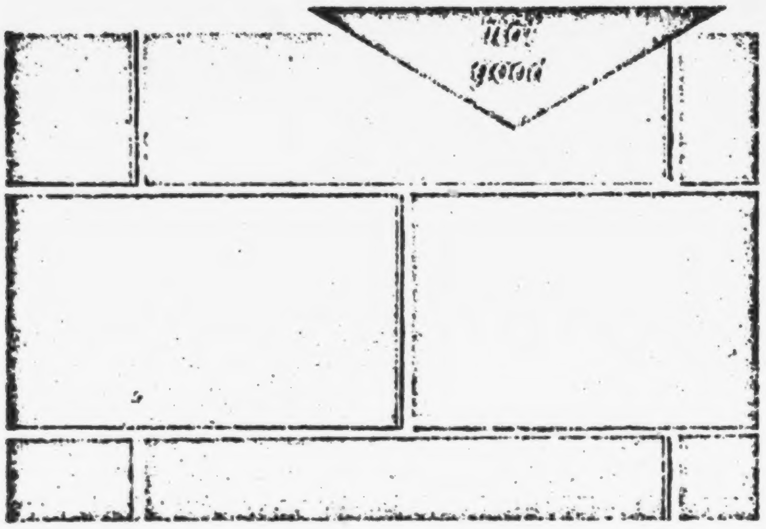
Fill joints with pointing mortar, using rubber face trowel as a squeegee to spread and remove excess mortar. Wet wall joints thoroughly first if tiles are dry. Fill all joints fully and flush with face of glazed units.



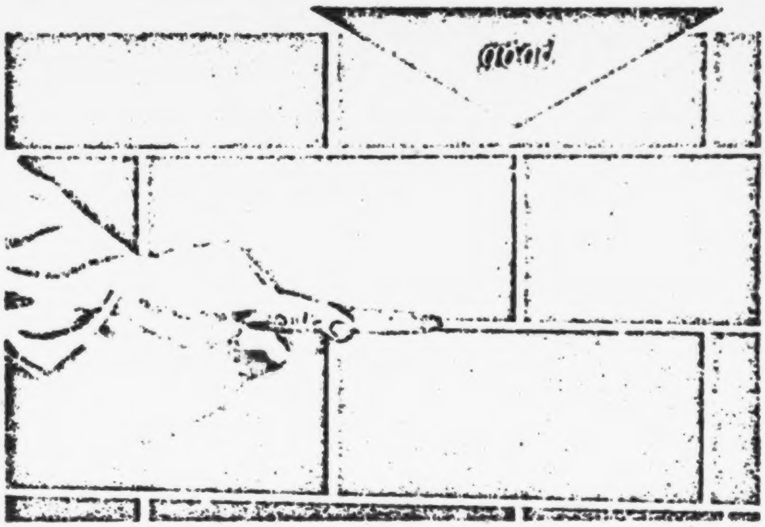
Deeply concave joints are not acceptable. Note that heavy shadows accentuate unevenness. They are dirt catchers and hard to keep clean. They defeat the purpose of structural glazed facing tile walls.



Use a clean, flat sponge and lightly wipe off all excess mortar from the glazed surface. Wipe carefully and make mortar *smooth, flat* and *flush* with the glazed surface. Care should be taken that there is no overlapping of mortar on the surface of the units.



When joints are tooled too deeply with a small radius tool, the job does not look its best. Imperfections in material and workmanship are accentuated by the irregular shadows cast in these deep joints.



An alternate method of smooth finishing the mortar joints is to tool the mortar while it is still workable. If tooling is done, use a smoother with at least 1 inch diameter. The tooled joint should be nearly flat — just barely concave. This makes a clean, smooth wall without variable shadows between the units.

THE ROBINSON BRICK AND TILE COMPANY

5B Structural Steel and Miscellaneous Iron

1. Check required tests to be performed and allow no erection until testing laboratory reports are in your hands. Make certain that you identify testing laboratory die stamps and tags before allowing work to be incorporated into job.

2. Even though structural steel and miscellaneous iron material and fabrication tests are performed by the laboratory, the inspector must spot check webs, flanges, hangers, clip angles, etc. for size and thickness upon delivery to job.

3. Check surface condition of metal for cleanliness before allowing prime coat touch-up of specified metal primer. This includes abrasions of surface due to delivery and erection or careless handling.

4. Structural field welding must be performed by a certified welder who has a card or letter as evidence of his competence.

5. During erection of structural steel and placement of miscellaneous iron, make certain that beams and columns are properly seated, that beams have specified camber and that bolted connections are perfectly matched and in compliance with drawings. Allow absolutely no torching, drilling or reaming of steel members without the architect's approval. Check specifications for type of bolts, if used.

6. Steel framework must be plumbed and guyed or adequately braced during and after erection and all bolted connections must be tightened. Check each rivet for tightness, if used.

7. Check density and quality of dry pack used under specified base and leveling plates and follow adequate curing of this installation.

8. Many miscellaneous metal items are finished and should be well protected from damage after installation.

5C Sheet Metal

1. Gauges of metals being used, proper fabrication, proper workmanship and compliance with contract documents and shop drawings are the prime factors to be considered in this section.

2. If proper consideration is not given to expansion factors, the inspector shall consult architect for determination.

3. Materials specified to be painted will normally be primed. The inspector shall make certain that an approved etching primer is being used on galvanized metals and that coverage is adequate.

4. Stainless steel installations require top quality workmanship and the finished product shall reflect this effort and ability with neatly ground and polished joints, absence of warps, buckles and scratches and with adequate drainage provided on sinks and drains.

5. Fasteners and anchors of sheet metal products should be of like material.

6. Because of possibility of corrosion through galvanic action, copper should be separated from other metals by an insulating layer of lead or plastic material.

7. Observe installation of all metal flashing work according to published standards of the sheet metal industry.

6A Rough Carpentry

1. Check all lumber and plywood delivered to job site for proper grade marking. All plywood delivered to job site shall bear a proper stamp and upon delivery shall be adequately protected.

2. If it is discovered at time of setting sills that bolts have been misplaced or omitted, the inspector shall contact the architect for remedial measures to be taken. All bolts must have adequate washers and/or plates and all nuts must have full thread bearing. All bolts shall be tightened as work progresses and retightened just prior to lathing. All drilling, boring and sub-boring must be in strict conformance with contract specifications.

3. Wood sills specified to be dry packed shall be completely bedded before permitting any load to be imposed thereon. Make certain that preservative treatment has been confirmed as required where wood is in contact with concrete or masonry and on exterior grade conditions where not adjacent to paved areas.

4. As framing progresses, give special attention to improper drilling, nailing, splitting, splices, shear panels and specially nailed, screwed or bolted connections. Check for perfect seating of bearing framing members. Pre-drilling is required to prevent splits and should be observed where necessary. Splice nailing and bolting is of the utmost importance, along with diaphragm placing and nailing. Bear in mind that required backnailing must be performed progressively or it may be forgotten.

5. If pneumatic nailers are used for sheathed diaphragms, all "shiners" must be backed out and replaced with legitimate nails.

6. All backing must be provided during framing stage for various installations, such as beam supports, chords and future attachments of hardware, plumbing and electrical fixtures.

7. Framing shall be level, plumb and in good alignment, in complete accordance with plan details. Excessively warped or bowed framing members cannot be allowed; they will not correct themselves and should be removed. Rafters and joists shall be straightened and secured with a temporary ribbon before placing and nailing sheathing.

8. Drilling of plates must be in conformance with contract specifications. Allow no unnecessary notching of plates or studs for the installation of piping or electrical conduit. If any drilling or notching of plates or beams should be deemed necessary, consult architect for decision.

9. Normally furring shall be provided by the contractor as directed by the architect and must be a legal, substantial installation.

AMERICAN LUMBER STANDARDS COMMITTEE

P. O. BOX 1554 • ROCKVILLE, MARYLAND 20850

E. M. McGOWIN, Chairman
A. J. AGATHER, Vice Chairman
F. J. HANRAHAN, Treasurer
G. A. THOMPSON, Secretary

Office of Secretary
336 Hungerford Drive
Hungerford Court Office Bldg.
Tel: 762-5050
Area 301

June 1, 1966

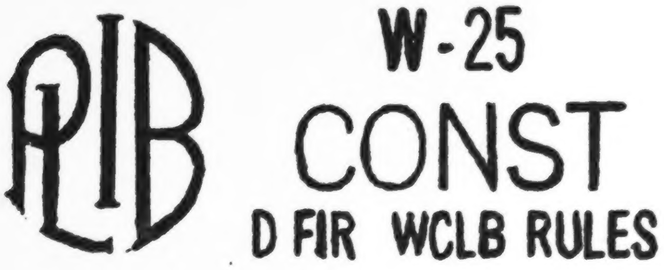
(This list supersedes list dated April 1, 1965)

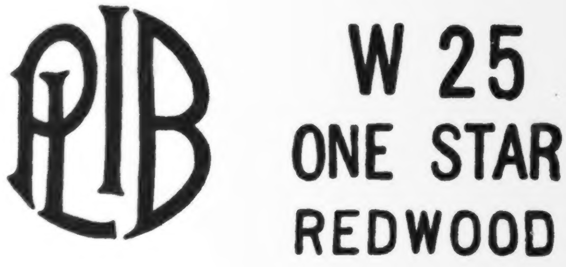
AGENCIES CERTIFIED BY BOARD OF REVIEW
AMERICAN LUMBER STANDARDS COMMITTEE
and
Facsimiles of Their Typical Grademarks

(Certification by the Board of Review is limited to the inspection and grading of untreated softwood lumber in yard, structural and shop grades. It does not include the grading or inspection of any treated material, poles, piles, cross-arms, car lumber, ties, hardwoods, etc., which are not within the scope of American Lumber Standards.)

Name and Address	Date of Certification
1. PACIFIC LUMBER INSPECTION BUREAU, INC. White-Henry-Stuart Building Seattle, Washington 98101	11/22/54

Approval as an inspection agency including mill supervisory service under the rules of West Coast Lumber Inspection Bureau, Western Wood Products Association and Redwood Inspection Service.

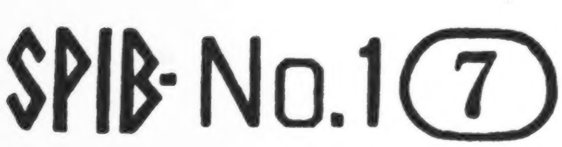


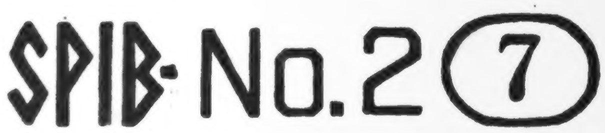


Note: Grading done under WCLIB rules unless WWPA rules indicated in the grade mark. Redwood indicates grading under RIS rules.

Name and Address	Date of Certification
2. SOUTHERN PINE INSPECTION BUREAU National Bank of Commerce Building New Orleans, Louisiana 70150	11/22/54

Approval of rules they publish and as an inspection agency including mill supervisory service under these rules.

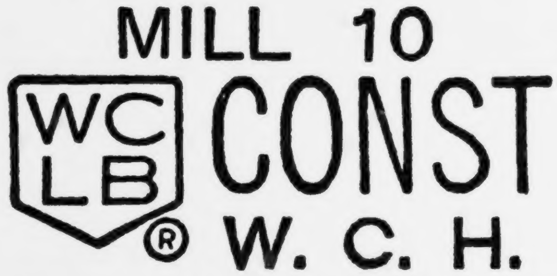


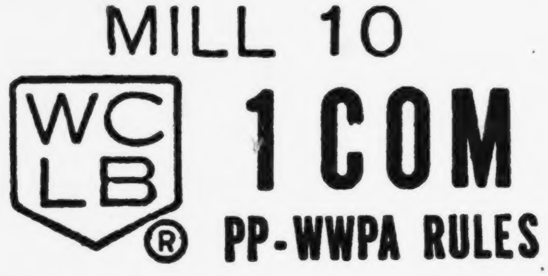


Note: Grading done under SPIB rules which they publish.

3. WEST COAST LUMBER INSPECTION BUREAU 3/4/55
1410 Southwest Morrison Street
Portland, Oregon 97205

Approval of rules they publish and as an inspection agency including mill supervisory service under these rules, the rules of the Redwood Inspection Service and the Western Wood Products Association.

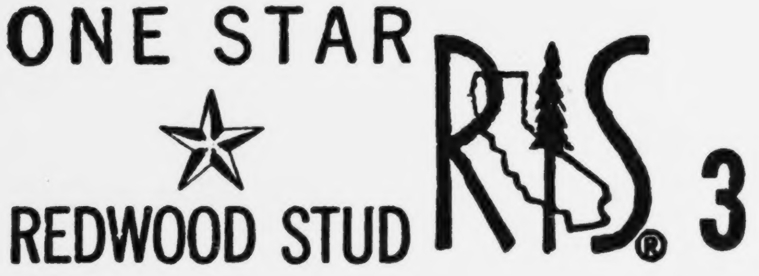

MILL 10
WC LB
CONST
®
W. C. H.

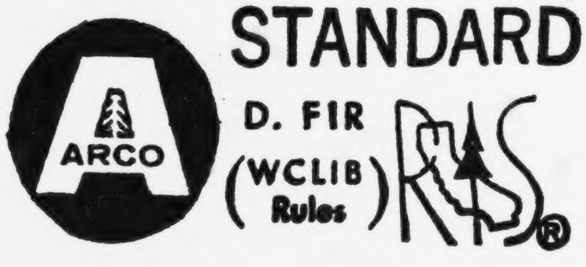

MILL 10
WC LB
1 COM
®
PP-WWPA RULES

Note: Grading done under WCLIB rules which they publish unless WWPA rules indicated in grade mark. Redwood indicates grading under RIS rules.

4. REDWOOD INSPECTION SERVICE (Supersedes California Redwood Association 11/22/61)
617 Montgomery Street
San Francisco, California 94111 Original Certification 12/13/55

Approval of rules they publish and as an inspection agency including mill supervisory service under these rules, the rules of the West Coast Lumber Inspection Bureau and the Western Wood Products Association.

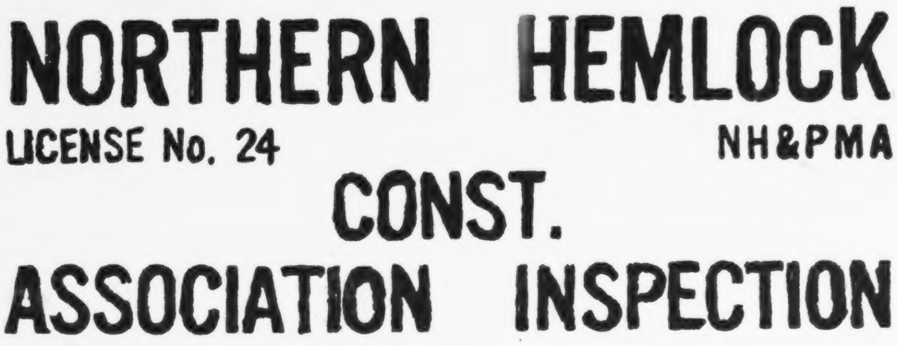

ONE STAR
REDWOOD STUD
RIS
®
3


ARCO
STANDARD
D. FIR
(WCLIB Rules)
RIS
®

Note: Grading done under RIS rules which they publish unless WCLIB or WWPA rules indicated in grade mark.

5. NORTHERN HARDWOOD AND PINE MANUFACTURERS ASSOCIATION 5/1/56
Suite 207, Northern Building
Green Bay, Wisconsin

Approval of grading rules they publish and as an inspection agency including mill supervisory service under these rules.

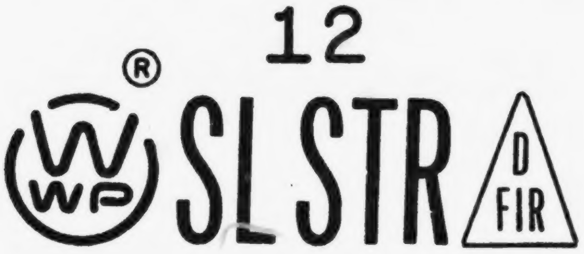

NORTHERN HEMLOCK
LICENSE No. 24
NH&PMA
CONST.
ASSOCIATION INSPECTION

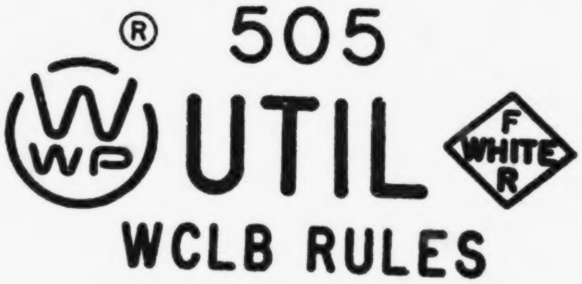
Note: Grading done under NH&PMA rules which they publish.

6. WESTERN WOOD PRODUCTS ASSOCIATION
700 Yeon Building
Portland, Oregon 97204

(Supersedes Western Pine
Association 5/7/64)
Original Certification 5/1/56

Approval of grading rules they publish and as an inspection agency including mill supervisory service under these rules and the rules of the West Coast Lumber Inspection Bureau.



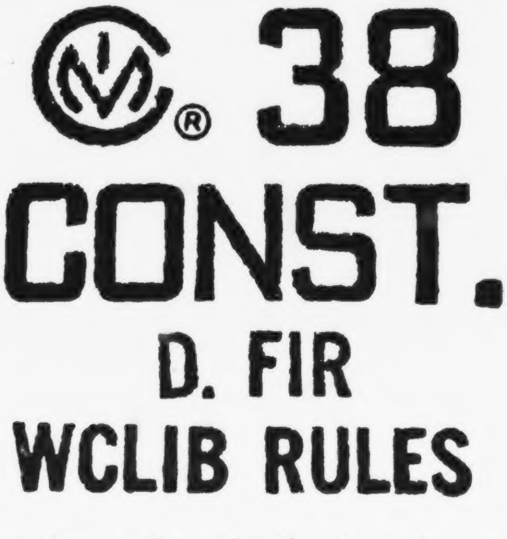


Note: Grading done under WWPA rules which they publish unless WCLIB rules indicated in grade mark.

7. McCALLUM INSPECTION COMPANY
1808 Hayward Avenue
Norfolk, Virginia 23519

2/5/57

Approval as a grading agency under the rules of West Coast Lumber Inspection Bureau and the Southern Pine Inspection Bureau and for Douglas Fir, Larch and Engelmann Spruce only under the rules of the Western Wood Products Association.

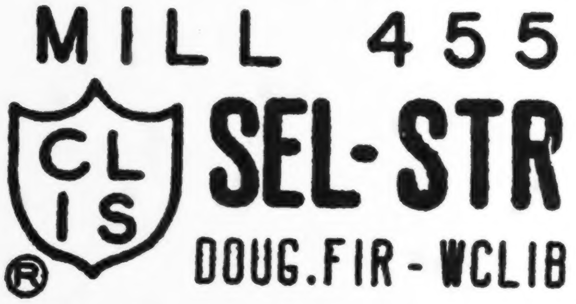


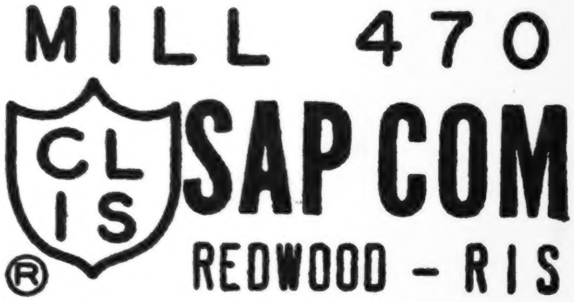
Note: Grading done under rules indicated in grade mark. Southern Pine graded under SPIB rules.

8. CALIFORNIA LUMBER INSPECTION SERVICE — 11/29/57 (Revised 11/13/59)

1190 Lincoln Avenue
San Jose, California 95125

Approval of rules on Monterey Pine that they publish and as an inspection agency including mill supervisory service under these rules and the rules of the West Coast Lumber Inspection Bureau, Western Wood Products Association and Redwood Inspection Service.


MILL 455
CL IS
SEL-STR
®
DOUG.FIR-WCLIB

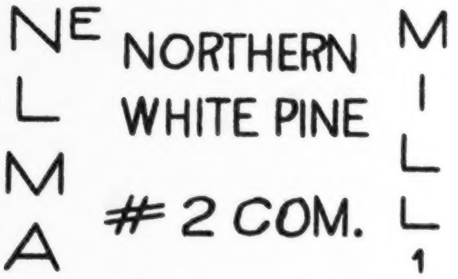

MILL 470
CL IS
SAP COM
®
REDWOOD - RIS

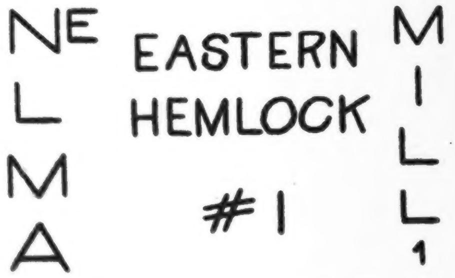
Note: Grading done under rules indicated in grade mark unless involving Monterey Pine which is graded under the rules they publish.

9. NORTHEASTERN LUMBER MANUFACTURERS ASSOCIATION, INC. — 11/29/57

271 Madison Avenue
New York, New York 10016

Approval of rules they publish and as an inspection agency under these rules and the Eastern Hemlock rules of the Northern Hardwood and Pine Manufacturers Association.


NE L M A
NORTHERN
WHITE PINE
#2 COM.
MILL 1

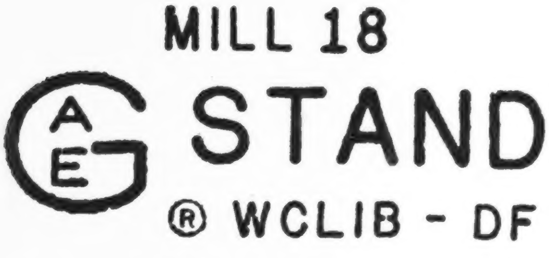

NE L M A
EASTERN
HEMLOCK
#1
MILL 1

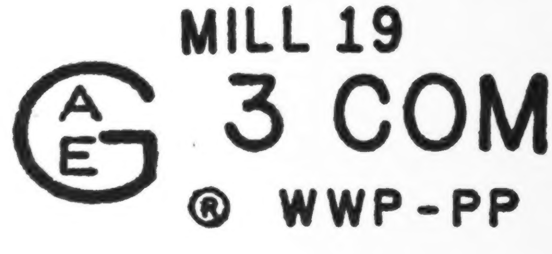
Note: Grading done under NELMA rules which they publish. Eastern Hemlock graded under NH&PMA rules.

10. A. E. GREEN LUMBER INSPECTION SERVICE — 7/23/58 (Revised 11/13/59)

861 Willamette, Room 201
Eugene, Oregon 97401

Approval as an inspection agency including mill supervisory service under the rules of West Coast Lumber Inspection Bureau and Western Wood Products Association and for studs only under the rules of the Redwood Insp. Service.


MILL 18
A E G
STAND
® WCLIB - DF


MILL 19
A E G
3 COM
® WWP-PP

Note: Grading done under rules indicated in grade mark. Redwood studs graded under RIS rules.

11. GENERAL TESTING AND INSPECTION AGENCY, INC. 5/13/59
2019 North Kilpatrick
Portland, Oregon 97217

Approval as an inspection agency under the rules of West Coast Lumber Inspection Bureau, Western Wood Products Association and Redwood Inspection Service.

GENERAL TEST & INSP, 15
STAND D.FIR
WCLIB RULES 15

Note: Grading done under rules indicated in grade mark. Redwood graded under RIS rules.

12. BODE INSPECTION, INC. 5/13/59
451 A Avenue
Lake Oswego, Oregon

Approval as an inspection agency under the rules of West Coast Lumber Inspection Bureau, the Western Wood Products Association and the Redwood Inspection Service.

5 B ®
WCLB RULES
UTIL
W C HEM

Note: Grading done under rules indicated in grade mark. Redwood graded under RIS rules.

13. A. W. WILLIAMS INSPECTION CO., INC. 8/7/59
208 Virginia Street
Mobile, Alabama

Approval as an inspection agency under the rules of the Southern Pine Inspection Bureau, West Coast Lumber Inspection Bureau and the Western Wood Products Association.

NOTE: See attachment for facsimile of new style stamp used for all species which are replacing the old style stamps (below) as needed.

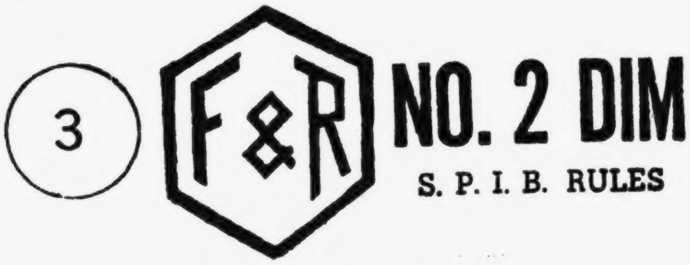
A. W. WILLIAMS INSP. CO. 46
No. 2
SPIB RULES SYP

H-24
H STAND. H
DOUG. FIR W.C.L.I.B. RULES
HICKOX INSPECTION

Note: Grading done under rules indicated in grade mark. Southern Pine graded under SPIB rules.

14. FROEHLING AND ROBERTSON, INC. 11/24/59
814 West Cary Street
Richmond, Virginia

Approval as an inspection agency under the rules of the Southern Pine Inspection Bureau.



Note: Grading done under SPIB rules.

15. SOUTHWESTERN LABORATORIES, INC.
Post Office Box 2671 3/1/60
Houston, Texas 77001

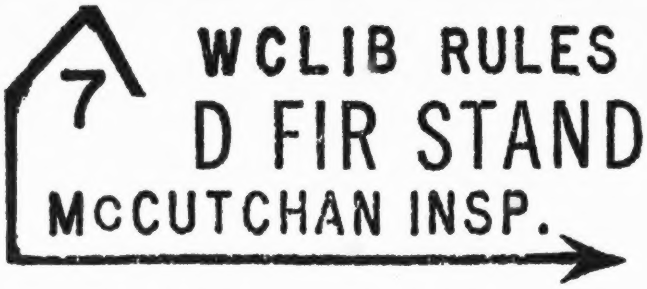
Approval as an inspection agency under the rules of the Southern Pine Inspection Bureau and the West Coast Lumber Inspection Bureau.

SOUTHWESTERN LABS.
CONSTR - WCLB RULES
D. FIR - 19

Note: Grading done under WCLIB rules except Southern Pine graded under SPIB rules.

16. McCUTCHAN INSPECTIONS, INC. 3/22/66
5835 Ann Arbor N. E.
Seattle, Washington 98105

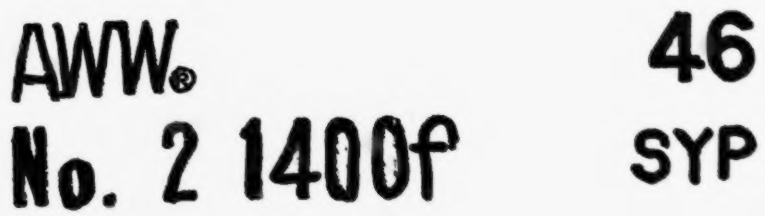
Approval as an inspection agency under the rules of West Coast Lumber Inspection Bureau and Western Wood Products Association.



Note: Grading done under rules indicated in grade mark.

NEW STYLE STAMP USED FOR ALL SPECIES AND REPLACING THE OLD TYPE STAMP WHEN THEY ARE NEEDED

A. W. WILLIAMS INSPECTION CO., INC.
Mobile, Alabama, 36603


AWW®
46
No. 2 1400f
SYP

AWW®
46
No. 2 1400f
SYP

Key Definitions:

Plywood:

A panel product made from a number of thin sheets of wood (veneers). Select logs are peeled in giant lathes to form veneer of uniform thickness. This material is bonded with the grain of each ply running at right angles to adjacent plys. Cross-bonding produces high strength in both directions providing a basic light-weight panel product ideal for hundreds of uses in construction and industry.

Type:

Plywood is manufactured in two types—Exterior type with 100 per cent waterproof glue and Interior type with highly moisture resistant glue. Veneers used in inner plys in Interior type plywood may be of lower grade than those in Exterior type. Specify Exterior type for all exposed applications. Interior type plywood is highly moisture resistant but the bond is not permanently waterproof. It may be used anywhere it will not be subject to continuing moisture conditions or extreme humidity.

Grade:

Within each type of plywood there is a variety of appearance grades determined by the grade of the veneer (N, A, B, C, or D) used for the face and back of the panel. Grades are generally designated by type of glue and by veneer grade on the face and back.

Product Standard:

Softwood plywood is manufactured in accordance with Product Standard PS 1-66 for Softwood Plywood —Construction and Industrial. American Plywood Association's DFPA grade-trademarks are positive identification of plywood manufactured in conformance with PS 1-66 and rigid quality standards of the Association.

Group:

Plywood is manufactured from some 30 different species of varying strength. Species involved have been grouped on the basis of stiffness and, for purposes of Product Standard PS 1-66, divided into four classifications designated Group 1, Group 2, Group 3 and Group 4. Strongest woods are found in Group 1. (See table below). The Group number that appears in the DFPA grade-trademark is based on species used in face and back.

STRUCTURAL I, STRUCTURAL II:

New unsanded construction grade under Product Standard PS 1-66. Special limitations on species. Made only with Exterior glue. Designed for demanding construction applications where properties such as nail-bearing, shear, compression, tension, etc., are of maximum importance. Examples: roof decking engineered as a structural diaphragm, box beams, gusset plates, stressed-skin panels and shipping containers.

STANDARD (with Exterior glue):

Interior type STANDARD C-D sheathing is also available with fully waterproof adhesives identical to those used in full Exterior type grades. Although these panels will retain their structural integrity under most conditions, the presence of D veneers in inner plys and backs may result in localized glueline weakness when subject to wet or highly humid conditions.

Identification Index Number:

A set of two numbers separated by a slash that appears in the grade-trademarks on STANDARD sheathing, STRUCTURAL I, STRUCTURAL II and Exterior C-C. Number on left indicates spacing in inches for supports when the panel is used for roof decking. The number on the right shows the spacing in inches for supports when the panel is used for subflooring. (See back cover.)

Class I, Class II:

Applies only to Plyform grade for concrete form applications. Indicates species mix permitted in this grade. Plyform Class I limited to Group 1 faces, Group 1 or Group 2 core, species of any group for center. Plyform Class II limited to Group 1 or Group 2 faces, species of any group for inner plys. Optional make-up for Plyform Class II permits faces of Group 3 if 1/8" thick before sanding and if core is limited to Group 1, 2, or 3 species.

Classification of Species

Group 1	Group 2		Group 3	Group 4
Douglas fir 1	Cedar, Port Orford	Hemlock, Western	Alder, red	Cedar
Larch, Western	Douglas fir 2	Lauan	Cedar, Alaska yellow	Incense
Pine, Southern	Fir	Red	Pine	Western red
Loblolly	California red	White	Lodgepole	Fir, subalpine
Longleaf	Grand	Pine, Western white	Ponderosa	Pine, sugar
Shortleaf	Noble	Spruce, Sitka	Redwood	Poplar, Western
Slash	Pacific Silver			Spruce, Engelmann
Tanoak	White			

Douglas fir 1 -- Washington, Oregon, California, Idaho, Montana, Wyoming, British Columbia, Alberta.
Douglas fir 2 – Nevada, Utah, Colorado, Arizona, New Mexico.

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Veneer grades used in plywood

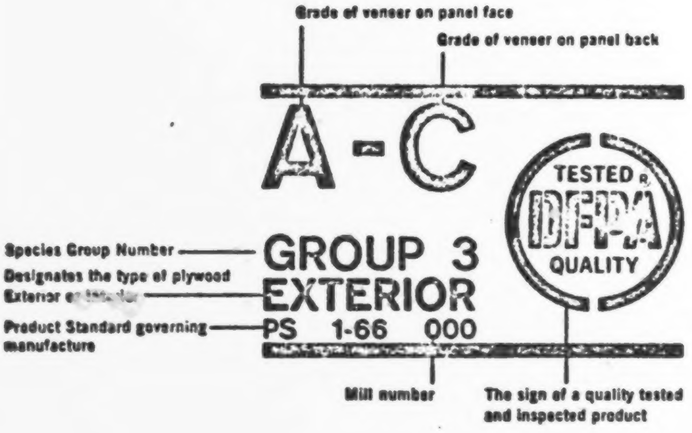
(Summary . . . see PS 1-66 for complete specifications.)

Veneer Grade	Defect Limitations
N Intended for Natural Finish	Presents smooth surface. Veneer shall be all heartwood or all sapwood free from knots, knotholes, splits, pitch pockets, other open defects, and stain, but may contain pitch streaks averaging not more than 3/8" wide blending with color of wood. If joined, not more than two pieces in 48" width; not more than three pieces in wider panels. Joints parallel to panel edges and well-matched for color and grain. Repairs shall be neatly made, well-matched for color and grain, and limited to a total of six in number in any 4' x 8' sheet. • Maximum of three "router" patches not exceeding 3/4" x 3-1/2" admitted. No overlapping. • Shims admitted not exceeding 12" in length but may occur only at ends of panel. (Examples of permissible combinations: 3 router patches and 3 shims, 2 router patches and 4 shims, 1 router patch and 5 shims, or 6 shims). Suitable synthetic fillers may be used to fill 1/32" wide checks, splits up to 1/16" x 2", and chipped areas or other openings not exceeding 1/8" x 1/4".
A	Presents smooth surface. Admits—Pitch streaks blending with color of wood and averaging not more than ⅜" in width. —Sapwood. —Discolorations. Veneer shall be free from knots, knotholes, splits, pitch pockets and other open defects. If of more than one piece, veneer shall be well joined. Repairs shall be neatly made, parallel to grain, and limited to 18 in number in any 4' x 8' sheet, excluding shims; proportionate limits on other sizes. Patches of "boat," "router," and "sled" type only, not exceeding 2-1/4" in width, and may be die-cut if edges are cut clean and sharp. Radius of ends of boat patches shall not exceed 1/8". • Multiple patching limited to 2 patches, neither of which may exceed 7" in length if either is wider than 1". • Shims admitted except over or around patches or as multiple repairs. Suitable synthetic fillers may be used to fill 1/32" wide checks, splits up to 1/16" x 2", and chipped areas or other openings not exceeding 1/8" x 1/4".
B	Presents solid surface. Admits—Knots up to 1" across the grain if both sound and tight. —Pitch streaks averaging not more than 1" in width. —Discolorations. —Slightly rough but not torn grain, minor sanding and patching defects, including sander skips not exceeding 5% of panel area. Veneer shall be free from open defects except for splits not wider than 1/32", vertical holes up to 1/16" in diameter if not exceeding an average of one per square foot in number, and horizontal or surface tunnels up to 1/16" in width and 1" in length not exceeding 12 in number in a 4' x 8' sheet (proportionately on other sizes). Repairs shall be neatly made and may consist of patches, plugs, synthetic plugs and shims. • Patches may be "boat," "router," and "sled" type not exceeding 3" in width individually when used in multiple repairs or 4" in width when used as single repairs. • Plugs may be "circular," "dog-bone," and "leaf-shaped," not exceeding 3" in width when used in multiple repairs or 4" in width when used as single repairs. • Synthetic plugs shall present a solid, level, hard surface not exceeding above dimensions. Suitable synthetic fillers may be used to fill small splits or openings up to 1/16" x 2", and chipped areas or other openings not exceeding 1/8" x 1/4".
C	Admits—Tight knots up to 1½" across the grain. —Knotholes not larger than 1" across the grain. Also an occasional knothole not more than 1½" measured across the grain, occurring in any section 12" along the grain in which the aggregate width of all knots and knotholes occurring wholly within the section does not exceed 6" in a 48" width, and proportionately for other widths. —Splits ½" by one-half panel length; ⅜" by any panel length if tapering to a point; ¼" maximum where located within 1" of parallel panel edge. —Worm or borer holes up to ⅝" x 1½". Repairs shall be neatly made and may consist of patches, plugs, and synthetic plugs. Patches ("boat," including die-cut) not exceeding 3" in width individually when used in multiple repairs or 4" in width when used as single repairs. Plugs may be circular, "dog-bone" and leaf-shaped. Synthetic plugs shall present a solid, level, hard surface not exceeding above dimensions.
C (plugged)	Admits—Knotholes, worm or borer holes, and other open defects up to ¼" x ½". —Sound tight knots up to 1½" across the grain. —Splits up to ⅛" wide. —Ruptured and torn grain. —Pitch pockets if solid and tight. —Plugs, patches and shims.
D	D veneer used only in Interior type plywood and may contain plugs, patches, shims, worm or borer holes. Backs: Admits tight knots not larger than 2½" measured across the grain and knotholes up to 2½" in maximum dimension. An occasional tight knot larger than 2½" but not larger than 3" measured across the grain or knothole larger than 2½" but not larger than 3" maximum dimension, occurring in any section 12" along the grain in which the aggregate width of all knots and knotholes occurring wholly within the section does not exceed 10" in a 48" width and proportionately for other widths. Inner Plys: Knotholes limited as for backs. All Plys: Pitch pockets not exceeding 2-1/2" measured across the grain. Splits up to 1" except in backs only not more than one exceeding 1/2"; not exceeding 1/4" maximum width where located within 1" of parallel panel edge; splits must taper to a point. White pocket in inner plys and backs, not exceeding three of the following characteristics in any combination in any area 24" wide by 12" long. (a) 6" width heavy white pocket. (b) 12" width light white pocket. (c) One knot or knothole or repair 1-1/2" to 2-1/2", or two knots or knotholes or repairs 1" to 1-1/2".

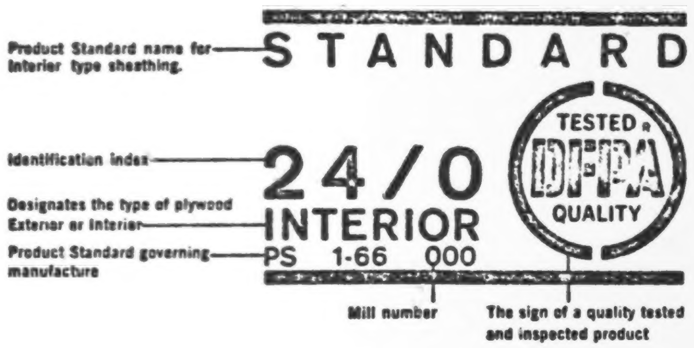
How to read the four basic grade-trademarks of the American Plywood Association

Product Standard PS 1-66 is a performance standard for clear understanding between buyer and seller. To identify plywood manufactured by association member mills under the requirements of Product Standard PS 1-66, four types of grade-trademarks are used to illustrate the plywood's type, grade, group,' class, and identification index. Here's how they look together with notations on what each element means.

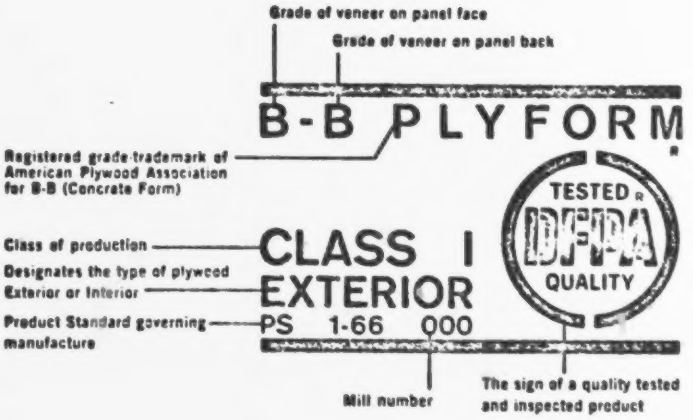
Sanded Grades


Grade of veneer on panel face
Grade of veneer on panel back
A-C
TESTED
DFPA
QUALITY
Species Group Number
GROUP 3
Designates the type of plywood Exterior or Interior
EXTERIOR
Product Standard governing manufacture
PS 1-66 000
Mill number
The sign of a quality tested and inspected product

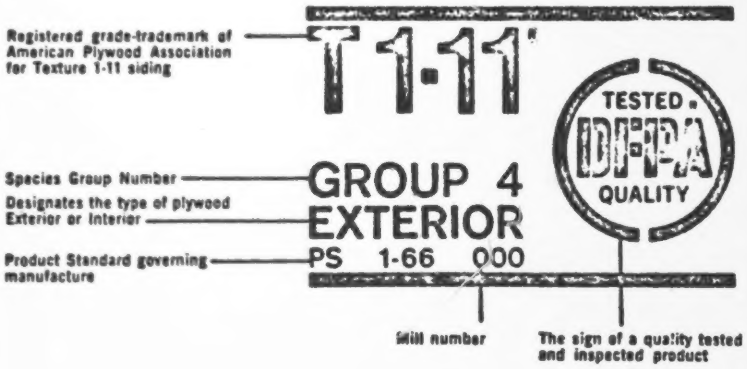
Unsanded Grades


Product Standard name for Interior type sheathing.
STANDARD
Identification index
24/0
TESTED
DFPA
QUALITY
Designates the type of plywood Exterior or Interior
INTERIOR
Product Standard governing manufacture
PS 1-66 000
Mill number
The sign of a quality tested and inspected product

Concrete Form

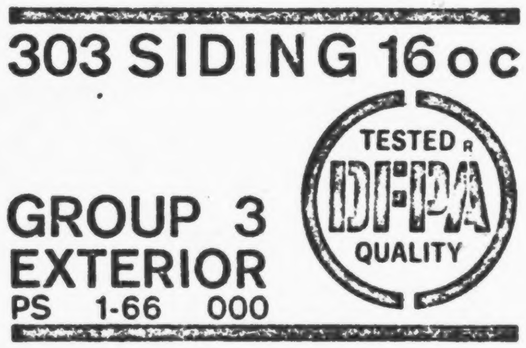

Grade of veneer on panel face
Grade of veneer on panel back
B-B PLYFORM
Registered grade-trademark of American Plywood Association for B-B (Concrete Form)
TESTED
DFPA
QUALITY
Class of production
CLASS I
Designates the type of plywood Exterior or Interior
EXTERIOR
Product Standard governing manufacture
PS 1-66 000
Mill number
The sign of a quality tested and inspected product

Specialty Panels

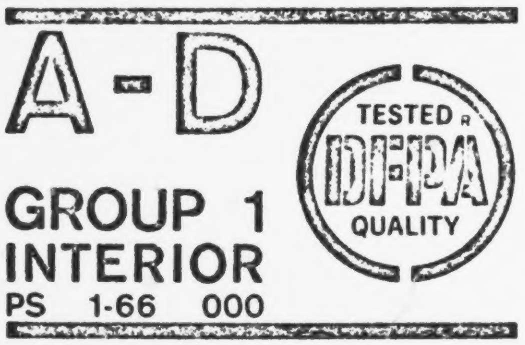

Registered grade-trademark of American Plywood Association for Texture 1-11 siding
T 1-11
TESTED
DFPA
QUALITY
Species Group Number
GROUP 4
Designates the type of plywood Exterior or Interior
EXTERIOR
Product Standard governing manufacture
PS 1-66 000
Mill number
The sign of a quality tested and inspected product

Index to the principal registered grade-trademarks of the American Plywood Association.

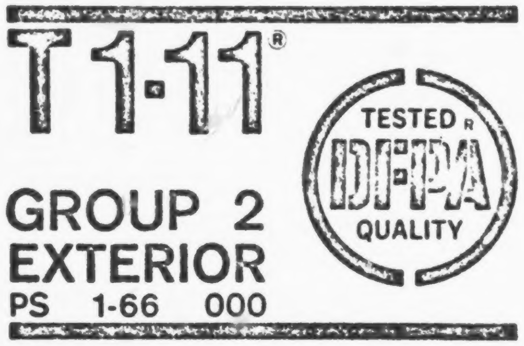
Appearance Grades


303 SIDING 16oc
TESTED R
DFPA
QUALITY
GROUP 3
EXTERIOR
PS 1-66 000

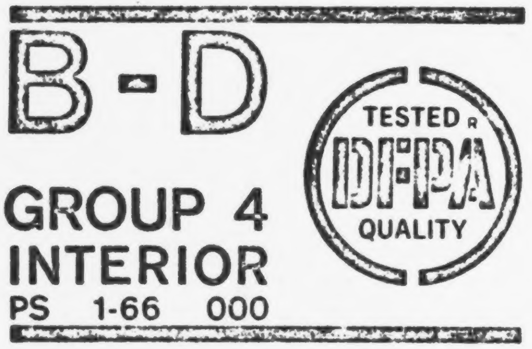
Also available in Groups 1, 2 and 4.


A-D
TESTED R
DFPA
QUALITY
GROUP 1
INTERIOR
PS 1-66 000

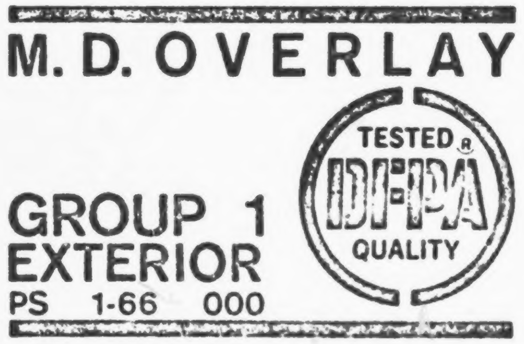
Also available in Groups 2, 3 and 4.


T1-11®
TESTED R
DFPA
QUALITY
GROUP 2
EXTERIOR
PS 1-66 000

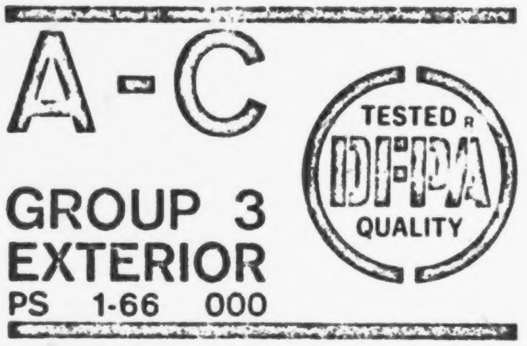
Also available in Groups 1, 3 and 4.


B-D
TESTED R
DFPA
QUALITY
GROUP 4
INTERIOR
PS 1-66 000

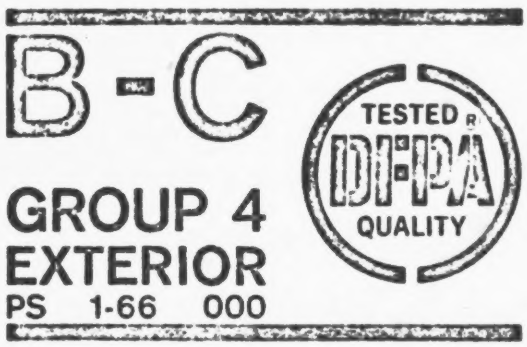
Also available in Groups 1, 2 and 3.


M. D. OVERLAY
TESTED R
DFPA
QUALITY
GROUP 1
EXTERIOR
PS 1-66 000

Also available in Groups 2, 3 and 4.


A-C
TESTED R
DFPA
QUALITY
GROUP 3
EXTERIOR
PS 1-66 000

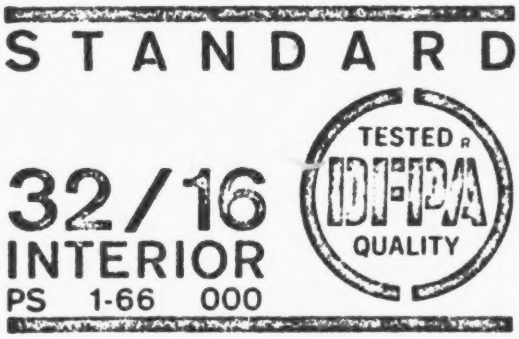
Also available in Groups 1, 2 and 4.


B-C
TESTED R
DFPA
QUALITY
GROUP 4
EXTERIOR
PS 1-66 000

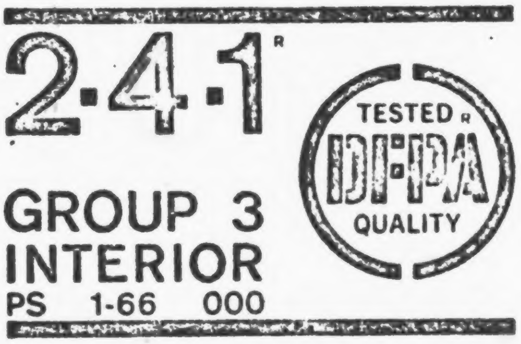
Also available in Groups 1, 2 and 3.

Construction and industrial grades

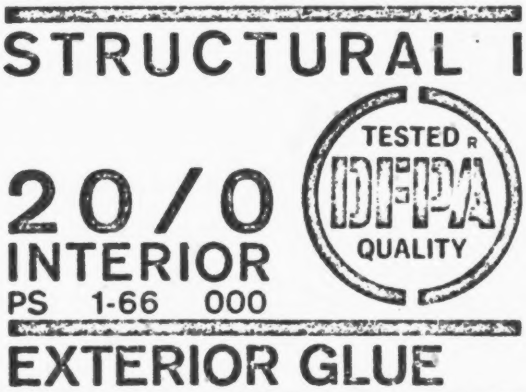
(All grades except Plyform available tongue and grooved in 1/2" or greater thickness.)


STANDARD
TESTED R
DFPA
QUALITY
32/16
INTERIOR
PS 1-66 000

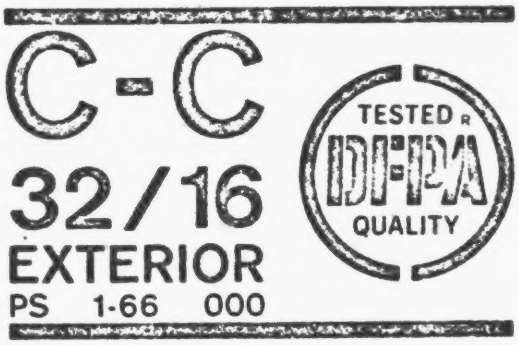
Also available with Exterior glue.

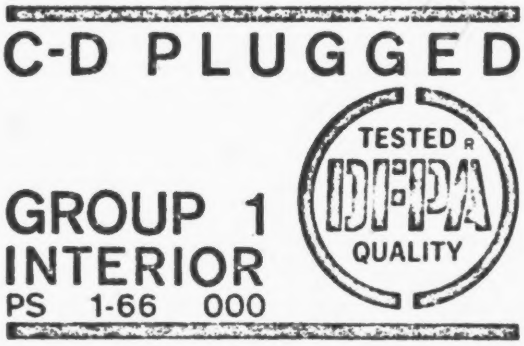

2·4·1 R
TESTED R
DFPA
QUALITY
GROUP 3
INTERIOR
PS 1-66 000

Also available in Groups 1 and 2 and with Exterior glue.

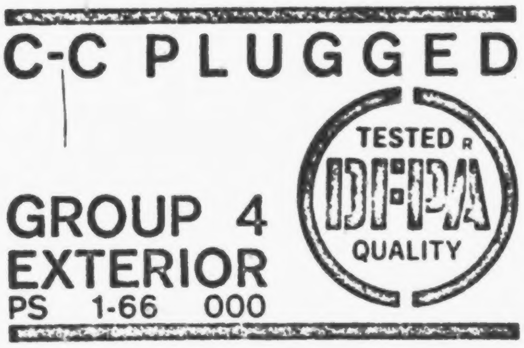

STRUCTURAL I
TESTED R
DFPA
QUALITY
20/0
INTERIOR
PS 1-66 000
EXTERIOR GLUE

Also available as Structural II. Both made only with Exterior glue.

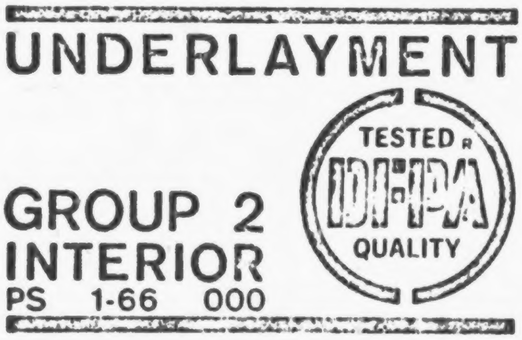

C-C
TESTED R
DFPA
QUALITY
32/16
EXTERIOR
PS 1-66 000


C-D PLUGGED
TESTED R
DFPA
QUALITY
GROUP 1
INTERIOR
PS 1-66 000

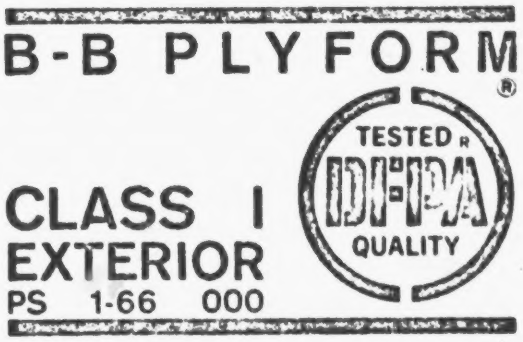
Also available in Groups 2, 3 and 4 and with Exterior glue. Unsanded or touch-sanded as specified.


C-C PLUGGED
TESTED R
DFPA
QUALITY
GROUP 4
EXTERIOR
PS 1-66 000

Also available in Groups 1, 2 and 3. Sanded or touch-sanded as specified.


UNDERLAYMENT
TESTED R
DFPA
QUALITY
GROUP 2
INTERIOR
PS 1-66 000

Also available in Groups 1, 3 and 4 and with Exterior glue. Sanded or touch-sanded as specified.


B-B PLYFORM ®
TESTED R
DFPA
QUALITY
CLASS I
EXTERIOR
PS 1-66 000

Also available in Class II and HDO.

Typical Edge-brands

A-A · G-1 · INT-DFPA · PS 1-66

A-B · G-2 · INT-DFPA · PS 1-66

B-B · G-3 · INT-DFPA · PS 1-66

A-A · G-4 · EXT-DFPA · PS 1-66

A-B · G-1 · EXT-DFPA · PS 1-66

B-B · G-2 · EXT-DFPA · PS 1-66

HDO · A-A · G-3 · EXT-DFPA · PS 1-66

MDO · B-B · G-4 · EXT-DFPA · PS 1-66

⚓MARINE · A-A · EXT-DFPA⚓ · PS 1-66

PLYRON · EXT-DFPA · PS 1-66

Grade-use guide for appearance grades of plywood (1)

	Use these symbols when you specify plywood	Description and Most Common Uses	Typical Grade-trademarks (2)	Veneer Grade			Most Common Thickness (inch) (3)						
				Face	Back	Inner Plys							
Interior Type	**N-N, N-A, N-B, N-D INT-DFPA**	Natural finish cabinet quality. One or both sides, select all heartwood or all sapwood veneer. For furniture having a natural finish, cabinet doors, built-ins. Use N-D for natural finish paneling. Special order items.	N-N · G-1 · INT-DFPA · PS 1-66 N-A · G-2 · INT-DFPA · PS 1-66	N	N,A, B or D	C or D	1/4					3/4	
	A-A INT-DFPA	For interior applications where both sides will be on view. Built-ins, cabinets, furniture and partitions. Face is smooth and suitable for painting.	A-A · G-3 · INT-DFPA · PS 1-66	A	A	D	1/4		3/8	1/2	5/8	3/4	1
	A-B INT-DFPA	For uses similar to Interior A-A but where the appearance of one side is less important and two smooth solid surfaces are necessary.	A-B · G-4 · INT-DFPA · PS 1-66	A	B	D	1/4		3/8	1/2	5/8	3/4	1
	A-D INT-DFPA	For interior uses where the appearance of only one side is important. Paneling, built-ins, shelving, partitions.	A-D GROUP 1 INTERIOR DFPA	A	D	D	1/4		3/8	1/2	5/8	3/4	1
	B-B INT-DFPA	Interior utility panel used where two smooth sides are desired. Permits circular plugs. Paintable.	B-B · G-3 · INT-DFPA · PS 1-66	B	B	D	1/4		3/8	1/2	5/8	3/4	1
	B-D INT-DFPA	Interior utility panel for use where one smooth side is required. Good for backing, sides of built-ins.	B-D GROUP 3 INTERIOR DFPA	B	D	D	1/4		3/8	1/2	5/8	3/4	1
	DECORATIVE PANELS	Rough-sawn, brushed, grooved or striated faces. Good for paneling, interior accent walls, built-ins, counter facing.	DECORATIVE · B-D · G-1 · INT-DFPA	C or btr.	D	D		5/16	3/8	1/2			
	PLYRON INT-DFPA	Hardboard face on both sides. For counter tops, shelving, cabinet doors, flooring. Hardboard faces may be tempered, untempered, smooth or screened.	PLYRON • INT-DFPA			C & D				1/2	5/8	3/4	
Exterior Type	**A-A EXT-DFPA (4)**	For use in exterior applications where the appearance of both sides is important. Fencing, wind screens, outdoor storage units, cabinet work exposed to the weather.	A-A · G-4 · EXT-DFPA · PS 1-66	A	A	C	1/4		3/8	1/2	5/8	3/4	1
	A-B EXT-DFPA (4)	For use similar to A-A EXT panels but where the appearance of one side is less important.	A-B · G-1 · EXT-DFPA · PS 1-66	A	B	C	1/4		3/8	1/2	5/8	3/4	1
	A-C EXT-DFPA (4)	Exterior use where the appearance of only one side is important. Sidings, soffits, fences, structural uses, privacy screens.	A-C GROUP 2 EXTERIOR DFPA	A	C	C	1/4		3/8	1/2	5/8	3/4	1
	B-B EXT-DFPA (4)	An outdoor utility panel with solid paintable faces.	B-B · G-1 · EXT-DFPA · PS 1-66	B	B	C	1/4		3/8	1/2	5/8	3/4	1
	B-C EXT-DFPA (4)	An outdoor utility panel for farm service and work buildings.	B-C GROUP 3 EXTERIOR DFPA	B	C	C	1/4		3/8	1/2	5/8	3/4	1
	HDO EXT-DFPA (4)	Exterior type High Density Overlay plywood with hard, semi-opaque resin-fiber overlay. Abrasion resistant. Painting not ordinarily required. For concrete forms, cabinets, counter tops.	HDO · A-A · G-1 · EXT-DFPA · PS 1-66	A or B	A or B	C plgd		5/16	3/8	1/2	5/8	3/4	1
	MDO EXT-DFPA (4)	Exterior type Medium Density Overlay with smooth, opaque, resin-fiber overlay heat-fused to one or both panel faces. Ideal base for paint. Highly recommended for siding and other outdoor applications. Also good for built-ins.	MDO · B-B · G-2 · EXT-DFPA · PS 1-66	B	B or C	C (5)		5/16	3/8	1/2	5/8	3/4	1
	303 SPECIAL SIDING EXT-DFPA	Grade designation covers proprietary plywood products for exterior siding, fencing, etc., with special surface treatment such as V-groove, channel groove, striated, brushed, rough-sawn.	303 SIDING 16 oc GROUP 4 EXTERIOR DFPA	B or btr.	C	C			3/8	1/2	5/8		
	T 1-11 EXT-DFPA	Exterior type, sanded or unsanded, shiplapped edges with parallel grooves 1/4" deep, 3/8" wide. Grooves 2" or 4" o.c. Available in 8' and 10' lengths and MD Overlay. For siding and accent paneling.	T·1·11 GROUP 1 EXTERIOR DFPA	C or btr.	C	C					5/8		
	PLYRON EXT-DFPA	Exterior panel surfaced both sides with hardboard for use in exterior applications. Faces are tempered, smooth or screened.	PLYRON • EXT-DFPA			C				1/2	5/8	3/4	
	MARINE EXT-DFPA	Exterior type plywood made only with Douglas fir or Western larch. Special solid jointed core construction. Subject to special limitations on core gaps and number of face repairs. Ideal for boat hulls. Also available with overlaid faces.	MARINE · A-A · EXT-DFPA · PS 1-66	A or B	A or B	B	1/4		3/8	1/2	5/8	3/4	1
	SPECIAL EXTERIOR	Premium Exterior panel similar to Marine grade but permits any species covered under PS 1-66.	A-A · G-2 · SPECIAL · EXT-DFPA · PS 1-66	A or B	A or B	B	1/4		3/8	1/2	5/8	3/4	1

NOTES:

(1) Sanded both sides except where decorative or other surfaces specified.

(2) Available in Group 1, 2, 3 or 4 unless otherwise noted.

(3) Standard 4x8 panel sizes, other sizes available.

(4) Also available in STRUCTURAL I (face, back and inner plys limited to Group 1 species).

(5) Or C plugged.

Grade-use guide for engineered grades of plywood

	Use these symbols when you specify plywood (1) (2)	Description and Most Common Uses	Typical Grade-trademarks	Veneer Grade			Most Common Thickness (inch) (3)							
				Face	Back	Inner Plys								
Interior Type	**STANDARD INT-DFPA**	Unsanded Interior sheathing grade for subflooring, wall sheathing and roof decking.	STANDARD 32/16 INTERIOR DFPA	C	D	D		5/16	3/8	1/2	5/8	3/4	7/8	
	STANDARD INT-DFPA (with exterior glue)	Same as STANDARD sheathing but has exterior glue. For construction where unusual moisture conditions may be encountered.	STANDARD 32/16 INTERIOR DFPA EXTERIOR GLUE	C	D	D		5/16	3/8	1/2	5/8	3/4	7/8	
	STRUCTURAL I and STRUCTURAL II INT-DFPA	Unsanded structural grades where plywood strength properties are of maximum importance. Structural diaphragms, box beams, gusset plates, stressed-skin panels. Made only with exterior glue. STRUCTURAL I limited to Group 1 species for face, back and inner plys. STRUCTURAL II permits Group 1, 2, or 3 species.	STRUCTURAL I 32/16 INTERIOR DFPA EXTERIOR GLUE	C	D	D		5/16	3/8	1/2	5/8	3/4	7/8	
	UNDERLAYMENT INT-DFPA (4)	For underlayment or combination subfloor-underlayment under resilient floor coverings, carpeting. Used in homes, apartments, mobile homes, commercial buildings. Ply beneath face is C or better veneer. Sanded or touch-sanded as specified.	UNDERLAYMENT GROUP 1 INTERIOR DFPA	C Plugged	D	C & D	1/4		3/8	1/2	5/8	3/4		
	C-D PLUGGED INT-DFPA (4)	For utility built-ins, backing for wall and ceiling tile. Not a substitute for Underlayment. Ply beneath face permits D grade veneer. Unsanded or touch-sanded as specified.	C-D PLUGGED GROUP 2 INTERIOR DFPA	C Plugged	D	D		5/16	3/8	1/2	5/8	3/4		
	2-4-1 INT-DFPA (5)	Combination subfloor-underlayment. Quality base for resilient floor coverings, carpeting, wood strip flooring. Use 2-4-1 with exterior glue in areas subject to excessive moisture. Unsanded or touch-sanded as specified.	2·4·1 GROUP 2 INTERIOR DFPA	C Plugged	D	C & D								1-1/8
Exterior Type	**C-C EXT-DFPA**	Unsanded grade with waterproof bond for subflooring and roof decking, siding on service and farm buildings.	C-C 32/16 EXTERIOR DFPA	C	C	C		5/16	3/8	1/2	5/8	3/4	7/8	
	C-C PLUGGED EXT-DFPA (4)	Use as a base for resilient floors and tile backing where unusual moisture conditions exist. For refrigerated or controlled atmosphere rooms. Sanded or touch-sanded as specified.	C-C PLUGGED GROUP 4 EXTERIOR DFPA	C Plugged	C	C	1/4		3/8	1/2	5/8	3/4	7/8	
	STRUCTURAL I C-C EXT-DFPA	For engineered applications in construction and industry where full Exterior type panels made with all Group 1 woods are required. Unsanded.	STRUCTURAL I C-C 32/16 EXTERIOR DFPA	C	C	C		5/16	3/8	1/2	5/8	3/4	7/8	
	B-B PLYFORM CLASS I & II EXT-DFPA	Concrete form grades with high re-use factor. Sanded both sides. Edge-sealed, and mill-oiled unless otherwise specified. Special restrictions on species. Also available in HDO.	B-B PLYFORM CLASS I EXTERIOR DFPA	B	B	C					5/8	3/4		

NOTES:

(1) All Interior grades shown also available with exterior glue.

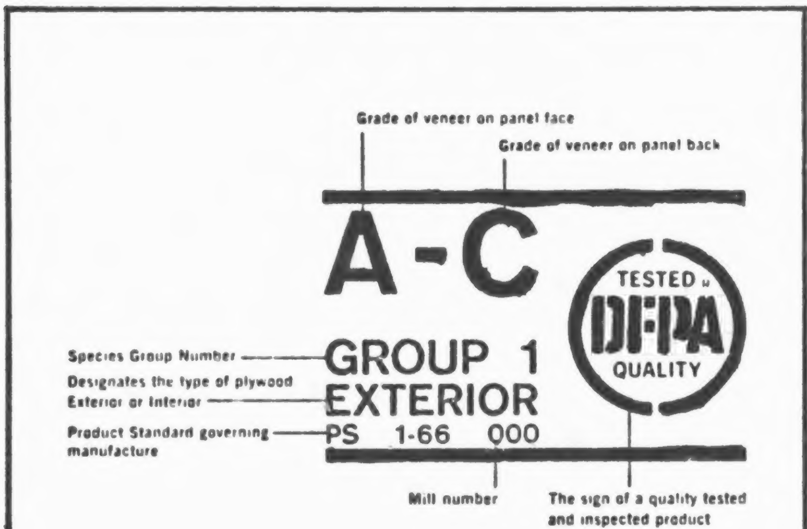
(2) All grades except Plyform available tongue and grooved in panels 1/2" and thicker.

(3) Panels are standard 4x8-foot size. Other sizes available.

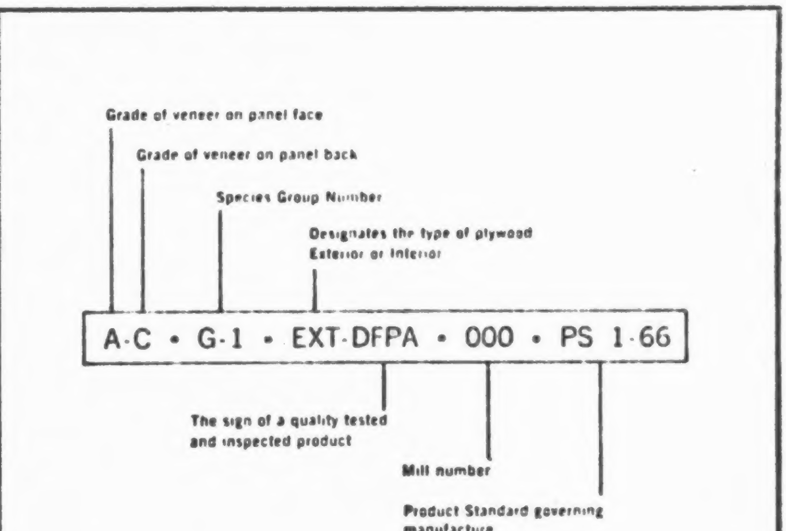
(4) Available in Group 1, 2, 3 or 4.

(5) Available in Group 1, 2 or 3 only.

Typical Back-stamp


Grade of veneer on panel face
Grade of veneer on panel back
A-C
GROUP 1
EXTERIOR
PS 1-66 000
TESTED
DFPA
QUALITY
Species Group Number
Designates the type of plywood Exterior or Interior
Product Standard governing manufacture
Mill number
The sign of a quality tested and inspected product

Typical Edge-mark


Grade of veneer on panel face
Grade of veneer on panel back
Species Group Number
Designates the type of plywood Exterior or Interior
A-C • G-1 • EXT-DFPA • 000 • PS 1-66
The sign of a quality tested and inspected product
Mill number
Product Standard governing manufacture

Guide to Identification Index on Engineered Grades(1)

Thickness (inch)	STANDARD (C-D) INT-DFPA (2) C-C EXT-DFPA			STRUCTURAL I (3) C-D INT-DFPA	STRUCTURAL II (3) C-D INT-DFPA	
	Group 1	Group 2 or 3 (4)	Group 4 (5)	Group 1 only	Group 1	Group 2 or 3 (4)
5/16	20/0	16/0	12/0	20/0	20/0	16/0
3/8	24/0	20/0	16/0	24/0	24/0	20/0
1/2	32/16	24/0	24/0	32/16	32/16	24/0
5/8	42/20	32/16	30/12	42/20	42/20	32/16
3/4	48/24	42/20	36/16	48/24	48/24	42/20
7/8	----	48/24	42/20	----	----	48/24

Notes:

1. The Identification Index numbers shown in the table appear in the DFPA grade-trademarks on STANDARD, C-C, STRUCTURAL I and STRUCTURAL II grades. They refer to the maximum recommended spacing of supports in inches when the panels are used for roof decking and subflooring. The left hand number shows spacing for roof supports and the right number shows spacing for floor supports. The numbers are based on panel thickness and species make-up detailed in Product Standard PS 1-66. Under each grade, the table identifies the species classification of the veneer used for outer plys..
2. Also available with Exterior glue.
3. Manufactured with Exterior glue only.
4. Panels made with Group 2 outer plys may carry the Identification Index numbers shown for Group 1 panels when they conform to special thickness and construction requirements detailed in PS 1-66.
5. Panels made with Group 4 outer plys may carry the Identification Index numbers shown for Group 3 panels when they conform to special thickness and construction requirements detailed in PS 1-66.

How to use table

The table above summarizes the various combinations of thickness and Identification Index numbers on the grades shown.

Suppose, for example, you want to use STANDARD INT-DFPA for roof decking to be used over supports 24" o.c. Look in the columns under this grade for Identification Indexes with 24 on the left side. You'll find 24/0 noted across from both the 3/8" and 1/2" thickness. Now suppose you want to use the same grade for suflooring with supports 16" o.c. Under STANDARD and C-C look for Identification Indexes with the number 16 on the right. You'll find 32/16 across from both the 1/2" and 5/8" thicknesses and you'll find 36/16 across from the 3/4" thickness.

When specifying plywood to be used for roof decking or subflooring, make sure to state the Identification Index. Thickness may also be stated if desired.

For wall sheathing, specify by grade and thickness. Index numbers do not apply.

Index numbers apply directly to roof decking and subflooring. They are also useful as a guide in other applications. When the same thickness is available with two or three different Index numbers, panels with the greatest Index numbers will be composed of species with the greatest strength.

Important note: The spans referred to in the Index numbers are accepted by most major building codes. Local interpretations may vary, however. So make sure your specifications comply with the local code under which you are building.

Method of ordering

Appearance grades: The regular method of specifying appearance grades is to designate the species group, number of pieces, width, length, number of plys, type, grade, finished thickness and agency certification of quality:

> "Group 2 plywood: 100 pcs., 48" x 96", 3-ply Interior type, A-D grade, sanded 2 sides to 1/4" thickness, DFPA grade-trademarked."

Construction and industrial: The method of specifying plywood sheathing is to designate grade, Identification Index, number of pieces, width, length, number of plys, thickness and agency certification of quality:

> "STANDARD, 24/0, 100 pcs., 48" x 96", 3 ply, 3/8" thick, DFPA grade-trademarked." (If exterior glue bond is desired, note "Exterior Glue.")

Concrete form: Designate the class, number of pieces, width, length, thickness and grade. Concrete form panels are edge-sealed and, unless otherwise specified, mill-oiled:

> "Plyform, Class I, 100 pcs., 48" x 96" x 5/8", B-B Exterior type, O. & E.S."

Specify plywood with the DFPA Grade-trademarks of the American Plywood Association

The American Plywood Association's DFPA grade-trademarks are positive identification of plywood which is subject to the testing and inspeciton program of the American Plywood Association manufactured in conformance with PS 1-66 and which meets the rigid quality and performance requirements of the Association. Don't take chances. Insist on plywood with the DFPA grade-trademark.

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5. Nomenclature and Definitions

5.1 — For purposes of this Product Standard, the trade terms used herein are defined as follows:

Back — The side of a panel that is of lower veneer quality on any panel whose outer plys are of different veneer grades.

Borer Holes — Voids made by wood-boring insects, such as grubs or worms.

Centers — Inner plys whose grain direction runs parallel to that of the outer plys.

Check — A lengthwise separation of wood fibers, usually extending across the rings of annual growth caused chiefly by strains produced in seasoning.

Class I, II — Term used to identify different species group combinations of B-B Concrete form panels. The Product Standard provides for two classes, Class I and Class II, as described in paragraph 3.4.3. See references in Appendix A for detailed product use information.

Cores — Inner plys whose grain direction runs perpendicular to that of the outer plys.

Core Gap (Center Gap) — An open joint extending through or partially through a panel, which results when core or center veneers are not tightly butted.

Crossband — Same as core.

Defects, Open — Irregularities such as splits, open joints, knotholes, or loose knots, that interrupt the smooth continuity of the veneer.

Edge Splits — Wedge-shaped openings in the inner plys caused by splitting of the veneer before pressing.

Face — The better side of any panel whose outer plys are of different veneer grades; also either side of a panel where the grading rules draw no distinction between faces.

Group — Term used to classify species covered by this Product Standard in an order that provides a basis for simplified marketing and efficient utilization. Species covered by the Standard are classified as Groups 1, 2, 3, and 4. See Table 2 for listing of species in individual groups and references in Appendix A for product use information.

Heartwood — Non-active core of a log generally distinguishable from the outer portion (sapwood) by its darker color.

Identification Index - A set of numbers used in the marking of sheathing grades of plywood. The numbers are related to the species of panel face and back veneers and panel thickness in a manner to describe the bending properties of a panel. They are particularly applicable where panels are used for roof sheathing and subflooring to describe recommended maximum spans in inches, under normal use conditions and to correspond with commonly accepted criteria. The left hand number refers to spacing of roof framing in inches and the right hand number refers to the spacing of floor framing in inches. Actual maximum spans are established by local building codes.

Jointed Core - Core veneer that has had edges machine-squared to permit tightest possible layup.

Knot - Natural characteristic of wood that occurs where a branch base is embedded in the trunk of a tree. Generally the size of a knot is distinguishable by (1) a difference in color of limbwood and surrounding trunkwood; (2) abrupt change in growth ring width between knot and bordering trunkwood; and (3) diameter of circular or oval shape described by points where checks on the face of a knot that extend radially from its center to its side experience abrupt change in direction.

Knotholes — Voids produced by the dropping of knots from the wood in which they are originally embedded.

Lap — A condition where the veneers are so placed that one piece overlaps the other.

Nominal Thickness — Full "designated" thickness. For example, 1/10 inch nominal veneer is 0.10 inch thick. Nominal 1/2 inch thick panel is 0.50 inch thick. Also, commercial size designation, subject to acceptable tolerances.

Patches — Insertions of sound wood in veneers or panels for replacing defects. "Boat" patches are oval-shaped with sides tapering in each direction to a point or to a small rounded end; "Router" patches have parallel sides and rounded ends. "Sled" patches are rectangular with feathered ends.

Pitch pocket — A well-defined opening between rings of annual growth, usually containing, or which has contained, pitch, either solid or liquid.

Pitch streak — A localized accumulation of resin in coniferous woods which permeates the cells forming resin soakes, patches, or streaks.

Plugs — Sound wood of various shapes, including, among others, circular, dog-bone, and leaf shapes, for replacing defective portions of veneer. Also synthetic plugs of fiber and resin aggregate used to fill openings and provide a smooth, level, durable surface. Plugs usually are held in veneer by friction until veneers are bonded into plywood.

Ply — One complete layer of veneer in plywood.

Repair — Any patch, plug, or shim.

Sapwood — The living wood of lighter color occurring in the outer portion of a log. Sometimes referred to as "sap."

Shim — A long, narrow repair of wood or suitable synthetic not more than 3/16 inch wide.

Shop cutting panel — Panels which have been rejected as not conforming to grade requirements of standard grades in this Product Standard. Identification of these panels shall be with a separate mark that makes no reference to this Standard and contains the notation, **"Shop Cutting Panel—All Other Marks Void."** Blistered panels are not considered as coming within the category covered by this stamp.

Split — Lengthwise separation of wood fibers completely through the veneer caused chiefly by manufacturing process or handling.

STANDARD — Name for unsanded interior type plywood commonly used for construction and industrial applications such as sheathing, subflooring, and limited exposure crates, containers, pallets and dunnage. Produced with C grade or better face veneer and D grade or better back veneer and inner plys. See references in Appendix A for product use information.

Streaks — See "Pitch streak."

STRUCTURAL I, II — Name used to identify panels that provide for greatest refinement of engineering properties which may be important in the use of plywood for structural components and other sophisticated engineered applications. Manufacturing requirements include special provisions for species, panel construction, and veneer grade characteristics as described in paragraph 3.4.4. See references in Appendix A for detailed product use information.

Torn grain — A (leafing, shelling, grain separation) separation on veneer surface between annual rings.

Touch-sanding — A sizing operation consisting of a light surface sanding in a sander. Sander skips to any degree are admissible.

Veneer – Thin sheets or layers of wood of which plywood is made.

Waterproof Adhesive – For purposes of this Product Standard, glue capable of bonding plywood in a manner to satisfy the exterior performance requirements given herein.

White pocket – A form of decay (Fomes pini) that attacks most conifers but has never been known to develop in wood in service. In plywood manufacture, routine drying of veneer effectively removes any possibility of decay surviving. (Admissible amounts of white pocket permitted by this Product Standard were established through a two-year research project at the U. S. Forest Products Laboratory.)

Light white pocket – Advanced beyond incipient or stain stage to point where pockets are present and plainly visible, mostly small and filled with white cellulose; generally distributed with no heavy concentrations; pockets for the most part separate and distinct; few to no holes through the veneer.

Heavy white pocket – May contain a great number of pockets, in dense concentrations, running together and at times appearing continuous; holes may extend through the veneer but wood between pockets appears firm. At any cross section extending across the width of the affected area, sufficient wood fiber shall be present to develop not less than 40% of the strength of clear veneer. Brown cubicle and similar forms of decay which have caused the wood to crumble are prohibited.

Wood Failure (percent) – The area of wood fiber remaining at the glueline following completion of the specified shear test. Determination is by means of visual examination and expressed as a percent of the one square inch test area. (See paragraph 4.4 for test.)

6B Finish Carpentry

1. All materials applied under this section shall be checked for conformance with contract drawings, shop drawings and specifications. Doors should be checked for brand, veneering, fabrication and edge banding. Trim should be checked for grading and detailing. Fire doors must have a label. Casework should be checked for fabrication, materials sizes, finish and setting. First-class workmanship is a must on these installations. Do not permit sloppy, ill-fitting or damaged work to be painted or finished in any manner. All edges must be eased and all sharp projections eliminated.

2. No finish carpentry materials shall be delivered, stored or set in rooms or buildings which are not dry and protected from the elements and working hazards and these materials must be sealed as specified upon delivery to project. The contractor shall take all reasonable precautions in protecting finish installations until completion and final inspection.

7A Roofing

1. All roofing installations shall be under diligent inspection by the job inspector whenever possible.

2. Material submittals and approvals shall be in the hands of the inspector prior to start of any roof application. Check consequent deliveries for conformance. If any delivered material is not identifiable by stamp, label, or affidavit, it should immediately be called to the contractor's attention and removed from the job site.

3. Roof surface is to be in proper condition to receive roofing application before any work is started.

4. Specified maximum asphalt temperatures must not be exceeded or material deterioration will result. This can best be controlled by checking recorded temperatures at intervals.

5. Specified roofing applications and sequences should be observed closely.

6. Water glaze is not acceptable for the glaze coat specified. In order to prevent deterioration and dirt accumulation, even properly glazed roofing must not be allowed to set for a long time. Rocking should be completed as soon as possible.

7. Various fire prevention measures shall be observed at all times, such as maintaining kettles the required distances from buildings and other inflammable materials, fire extinguishers on truck and roof, use of proper equipment.

8. "Is It Pitch or Asphalt?"

   Both materials are dark brown in color, are applied by somewhat comparable methods and both lend themselves to the solution of a variety of waterproofing problems. Following are a few simple tests which can be performed in the field to distinguish between asphalt and coal tar pitch.

   a. Observe the type of container, if the bituminous material is packaged. Coal tar pitch is always shipped in light metal, open-top drums whereas asphalt is usually shipped in paper cartons.

   b. Note the odor of fumes when the bituminous material is being heated in a kettle or a small sample is heated. Asphalt - a petroleum residual - has an odor similar to kerosene; pitch - a coal tar residual - has an odor similar to moth balls.

   c. Drop a small sample into gasoline, shake and let stand for a few minutes. Asphalt will dissolve in a short time and the gasoline will become brown; pitch will only slightly dissolve with little, if any discoloration of the gasoline.

7D Caulking

1. The caulking of joints should conform with the type specified.

2. Before caulking is started, the joint should be thoroughly cleaned, filled with oakum or rockwool to within one inch of surface and filled with caulking compound.

3. Joints in porous masonry should be treated with waterproofing material to prevent heavy absorption of oils from caulking compound, which may, in turn, cause excessive shrinkage, cracking and ultimate failure of the caulking.

4. Observe caulking operations to be sure that the full depth of the space is uniformly filled and not merely the surface coating.

8B Glass and Glazing

1. Glass shall be labeled and in compliance with specifications regarding thickness, wire glass, obscure glass and so on. Glazing putty or compound approved by architect must be used with no substitutions allowed. Required number of glazing points, clips, etc. shall be used. Bedding and facing putty operations shall be used even on interior glass where specified. Check specified edge finishing (penciled, etc.) on glass panels and verify proper number and location of ground finger pulls in sliding glass panels. Mirrors, skylights and sneeze barriers should all be checked in this portion of the contract and any defective glass replaced prior to final inspection.

9A Lathing and Plastering

The causes of plaster cracking are the result of some excessive internal or external stress. Structural weakness, imperfect lathing, improper ingredients or proportions, improper mixing or application of the plaster and poor atmospheric conditions are some of the causes.

1. Original and subsequent material deliveries must comply with specifications and approved submittals and protected from moisture and damage.

2. Room finish schedules shall be checked thoroughly to assure proper finish, such as gypsum board, plywood, plaster and for type of plastered finish, such as sand, textured, putty-coat, or dash.

3. All mixing shall be done in clean equipment. Quantity allowance is generally one hour's supply. Do not permit remixing of plaster starting to set.

4. Lathing operation shall be inspected for conformance with codes and specifications. Do not allow plasterers to proceed with initial coat until lathing in the general area has been completed and inspected. Mesh reinforcement at all corners. All lath end joints to be staggered. Cracked or damaged rock lath to be replaced.

5. Give special attention to the inspection of tied stripping and metal lath and to proper installation of suspended ceilings. Check corner beads, partitions and ceilings for plumb and level installations.

6. In some areas (showers, toilets) cement plaster will be specified on interior walls and conformance shall be observed.

7. All openings should have specified plaster grounds applied as directed. Grounds should be set for recommended minimum thickness for the particular plaster base being used.

8. Specified intervals between scratch, brown and color coat applications must be observed, especially between the brown and color coats on exterior cement plaster.

9. Specified curing must be enforced, including weekends and holidays.

9B Acoustic Tile

1. Ceiling stripping must be sized, lined, spaced and nailed properly before application of gypsum board backing or acoustic tile. Stripping shall be shingle wedged or brought to a reasonably uniform plane by some other acceptable method. Under no circumstances shall joist or purlin notching be permitted in order to accomplish this purpose. Acoustic material shall be in conformance with specifications and approved schedules regarding brand, size, type (textured, random hole, pattern hole) finish (slow-burning, enameled) and required attachments (nailed, glued, screwed, stapled). Layouts shall be made and tile installed from room centers, giving due consideration to borders, electrical fixtures, furred offsets, etc. Molding shall be installed in full length pieces whenever possible.

9C Resilient Flooring

1. Subflooring, sleepers, etc., shall be properly placed and nailed to receive finsish wood floors. Material grades of flooring shall comply with specifications and be verified by means of stamps or grade marks. Finish floor materials must not be delivered or stored in damp rooms. Observe specified lengths and direction of laying flooring. Proper nailing is mandatory. Specified floor finishing schedule must be followed. Traffic on finished wood floors shall be kept at a minimum until time of final inspection.

2. Concrete and plywood subfloors shall be clean, true and level to receive mastic for installing composition flooring. Colors, grades and thickness of finish materials shall be in conformance with specifications and approved finish schedule. Room layout for tiles shall be performed in such a manner that the installation will require a minimum of small pieces. Where base shoe or toe mold is not specified, the tile shall be fit snugly to adjacent walls and cabinets. Mastic shall be kept off adjacent walls and cabinets. Mastic shall be kept off adjacent installations and empty mastic cans shall be removed from the project. Normally a quick-setting cement compound is permitted for filling cracks and local depressions in slabs (1/4" is the maximum filling that should be permitted.)

9D Painting

1. Because of the time element involved and the complexities of preparation and application, this portion of the work requires diligent yet sensible supervision by the inspector. Basically, enforcement of a few simple rules will make inspection of this phase of the work much easier.

2. At the start of the painting operation, it should be emphasized to the paint foreman that no work is to be primed, stained or sealed that is not in perfect condition and that the finished product is his responsibility.

3. All coats of brush, roller or spray coverage must be adequate. Varying shades shall be used in each succeeding coat of pigmented paint to aid in distinguishing proper sequence and insure compliance with contract. If clear preservative or sealer is to be used, a slight amount of umber or other darkening agent shall be added to aid in inspection.

4. Required priming, back-priming, and sealing must be done immediately upon delivery of cabinets, doors, trim, etc. to the job site. However, some instances occurred when paint foremen were not thorough enough in establishing proper finishes and have used pigmented primer on materials that were to have had stained or natural finish. The inspector shall check finish schedules to prevent this.

5. Approved material lists and color selections shall be followed with no variations permitted unless authorized by the architect. A periodical check of materials in the paint room should be made by the inspector and all unauthorized materials and cans removed immediately.

6. Specified sanding, puttying, spotting and spackling between coats must be done in a thorough, conscientious manner.

7. Improper thinning or use of improper thinning materials must not be allowed.

9E Tile, Terrazzo and Marble

1. Ceramic tile installations shall be checked for contract compliance of material and workmanship. Walls and floors shall be checked prior to starting of work, and ample time shall be devoted by the inspector to verification of grout mix and bed preparations. All installations shall be in alignment, both vertically and horizontally and shall be properly grouted and cleaned upon completion. Cap members, corner members, liners, etc., shall be in conformance with contract documents. Upon completion of tile floors, a drainage test shall be performed to assure proper fall.

2. As with ceramic tile, the preparation for and installation of terrazzo shall be carefully watched from rough walls and floors through to the final grinding, sealing and polishing. Verify by observation and specified quantity of mix and the colors of marble chips used. Sufficient rolling must be performed to assure density and the removal of air bubbles. Proper stones shall be used as specified for grinding purposes.

3. Shop drawings are normally specified for marble installations and shall be approved by architect before work is started. Inserts, cutouts, hardware and materials in this installation shall be checked, along with proper setting, in order to assure plumb, level and perfectly aligned panels. Care shall be used in drilling panels for attachment of hardware and accessories. No chipped, cracked or blemished material shall be incorporated into job.

10A Finish Hardware

1. Finish hardware must comply with approved schedule and upon installation must operate properly and be kept free of all defects and blemishes as work progresses. Any faulty operation or finish is just cause for rejection.

2. The District locksmith will make a preliminary check of one initial hardware installation for suggested corrections, if any, and one complete hardware inspection near the project completion when called by the job inspector. At this time, if job is acceptable, he will sign required form (See Section VII) and accept delivery of all properly labeled keys, "Tel-key cabinet" and padlocks, as mentioned in Final Inspection Check List (Section VII).

11. Equipment

1. The best aid to checking this portion of the contract will be found in Section VII under "Final Inspection Check List" and in the contract specifications. There will be wide variations in types and amounts of contract equipment supplied from job to job, depending on size and type of school. The inspector shall be thorough in examining equipment operation and the component parts, as negligence here is usually a prime factor in excessive call-back items during the first month the equipment is used by the school personnel.

15 & 16 Plumbing, Heating and Electrical

1. Required mechanic, electrical and plumbing inspections may be anticipated if the subcontractor has completed portions of the installations (under test if necessary) for inspection at preappointed times. If installation is not complete at the appointed time and another inspection must be made, or undue delay is caused to the inspector, the future program will proceed on the basis of actual completion of portions before calling inspections.

2. Inspection records shall be maintained by the job inspector on forms provided (See Section VII). At time of final mechanical, electrical and plumbing inspections, one of these copies shall be given to maintenance foreman and the original shall be retained in the inspector's files.

3. Compliance with specified testing shall be enforced by inspector. Extraction tests as directed are to be used in testing transite (cement asbestos) lines and recording gauges shall be used in testing gas pipe.

4. The inspector shall identify materials used and shall allow no unauthorized substitutions.

5. If mechanical, electrical and plumbing inspectors request changes other than those needed to conform with contract documents and applicable codes, have the contractor submit a complete change order cost breakdown to the architect. Do not authorize any work in this category without official change order or written notification from the architect.

6. Conduit and piping installed must have required clearances and coverages when installed underground. All conduit and piping runs are to have only necessary bends, offsets and fittings and shall not be kinked or flattened. Preservative or waterproofing specified on pipe or conduit must be applied in a satisfactory manner.

7. Only approved fittings are to be used in assembling mechanical, electrical and plumbing installations.

8. Piping and electrical conduit must be kept capped or plugged as work progresses so that lines will be clean and free of all obstructions. Floor drains and sumps shall be kept plugged during ceramic tile, terrazzo and concrete operations. Abandoned or inactive sewers must be capped.

9. When services to existing schools are to be interrupted for any reason, the inspector shall coordinate the shutoff with the contractor, principal and head custodian. Even though school is not in session, custodians or other departments may require services. Normally, shutoff periods will have to occur during hours when school is not in session; the specifications point out this fact very clearly. Never permit meter, regulator or boiler disconnections without first notifying the school staff and the Maintenance Department.

10. Sheet metal gauges, suspension methods, duct and piping sizes and insulation on heating installations should be checked thoroughly for conformance.

11. All taps and splices shall be soldered and taped on electrical installation or made with approved solderless connectors. Under no circumstances shall spliced wire be pulled into any conduit.

12. Nicked, cracked, broken or blemished fixtures must be replaced before final inspection.

13. Required lamp and electrical fixture schedules must be obtained prior to job completion, along with specified operating, wiring and performance data on heating equipment (See Section VII, Final Inspection Check List).

14. Accurate plumbing, heating and electrical "as-built" drawings are of the utmost importance and shall be maintained as follows:

    a. The blue-line drawings procured from the architect's office for this purpose by the inspector at the start of the job must be kept in his office and legibly maintained up-to-date at all times by the foremen of the respective trades. General or subcontractor's record field prints will not be acceptable.

    b. Any changes in routing or equipment above ground, under slabs or in buildings are to be recorded legibly as such.

    c. No underground lines shall be backfilled until elevations and dimensions are recorded completely and check has been made by inspector. (Sewer and drain lines shall be recorded by location and elevation. Gas, water, heating, oil and conduit lines shall be recorded for dimension location only.)

    d. Elevations shall be given on job datum.

    e. Dimensions shall be given at each end of lines, whether parallel to dimension point or not.

    f. Any offsets, either in elevation or dimension, should be recorded as such whenever practical.

    g. Plugged tees and capped ends shall also be located on drawings.

    h. The inspector shall personally spot check recorded dimensions and elevations before allowing backfilling. A minimum of 25 percent of the recorded installation must be checked.

    i. Prior to final inspection, the inspector will see that these complete "as-built" drawings are in the hands of the architect.

15. Final inspections by the mechanical and electrical design engineers shall be secured before School District inspectors are requested to make their inspections.

SECTION V

Project Completion and Guarantee Follow-up

1. The major factors involved are covered generally in Section VII under "Final Inspection Check List." A step-by-step analysis of items listed thereon should result in a clean acceptable project.

2. The inspector shall coordinate with the architect the required final inspection and follow through by seeing that the contractor applies himself diligently to rectify discrepancy items noted on final inspection.

3. After all items of the punch list have been corrected in a satisfactory manner, the inspector shall notify the Director of Construction, who, in turn, will have final acceptance of the project placed on the agenda for the next regular meeting of the Board of School Trustees.

4. The inspector will complete and submit his final "Verified Progress Report".

5. Due to the District's one-year guarantee policy with the contractor, the inspector shall procure required form (See Section VII) for listing reported faulty items and corrections during guarantee period. This form is to be maintained up-to-date. When reported items have been corrected, the inspector shall notify the secretary at intervals so that she may list and process disposition of each item. The following is the recommended procedure for handling these items:

   a. Normally, the reported items will be given to the inspector by the Construction Office secretary. Upon receiving report, visit the school as soon as possible and inspect item before notifying architect and contractor.

      1. If, in your opinion, there has been improper use or abuse to the installation by school personnel, report your findings to the Director of Construction.

      2. If, on the other hand, the trouble stems from improper or faulty workmanship or materials, inform the architect immediately, requesting notification when correction has been made. (Send copies of report to architect and contractor.)

      3. If a reasonable time for making correction has elapsed and you have not been informed of correction, place another call to architect to pinpoint the delay.

      4. If no cooperation is then forthcoming, report item to Director of Construction along with all pertinent facts and dates so that he may take necessary steps.

b. Under no circumstances are you or any other District employee to dismantle, adjust, or reassemble any installation unless it is a very minor matter that common sense would dictate, or unless it is an emergency matter involving health or safety of the pupils and personnel.

6. The inspector shall have access to the file for reference if any problems arise, all contract documents, "as-built" drawings (when returned from architect), weekly log, job correspondence, test reports and schedules until the year guarantee period has expired.

7. Soon after receipt thereof, the job inspector shall check and verify correctness of the "as-built" tracings submitted to the District by the architect. Consequently, it is recommended that the architect be asked to return all "as-built" drawings submitted to him as soon as possible.

SECTION VI

MISCELLANEOUS

1. Assignment of District-owned vehicles

A. Type of Transportation

The type of transportation provided by the District will be in consideration of economy and the efficient performance of assigned duties, and in accordance with the guidelines given below:

Employee's Own Automobile, Mileage Paid (Report Form Section VII)

Mileage will be paid to employees for the use of their personal cars when:

a. Assigned duties require infrequent and irregular travel to other work stations.

b. Availability of personal car is required as prerequisite for position.

c. Where scheduled or regular travel is required, but is normally less than 500 miles per month.

d. Insurance: Use of privately owned cars.

The liability insurance carried by the Clark County School District includes an endorsement which provides liability coverage for all School District employees while using their personal cars for school business. This coverage is limited to employees of the Clark County School District. This liability coverage protects these individual operators of vehicles against liability for bodily injury or property damage done to others. It does not cover property damage to property of the driver.

District Pool Car, Assigned to Specific Employee

District pool cars shall be assigned to District employees when assigned duties require regularly scheduled travel to various work stations and where mileage normally exceeds 500 miles per month, or where their work requires tools and equipment to be transported between jobs, etc.

B. Definitions and Regulations

For all travel requirements within the District, the use of a District vehicle shall be first considered before other forms of transportation are authorized. No District vehicle shall be considered to be "permanently" assigned to any person or department. All District vehicles shall be considered to be available where they can best serve the transportation requirements of the total organization. The Director of Transportation shall maintain, in each vehicle, a package of information regarding accident reports.

The District reserves the right to inspect the personal vehicles owned by employees which are authorized for use under A1 Transportation.

District-owned automobiles shall be used only for the performance of duties directly benefiting the District and shall not be used for the personal convenience of any employee.

Every employee using a District automobile shall be responsible for its care and return in good condition. Employees using any vehicle in the performance of assigned duties shall have a valid current driver's license in accord with Nevada Motor Vehicle Regulations. (Nevada license required for any person who establishes a residence or takes employment in Nevada.)

District vehicles will be assigned, maintained and repaired under the responsibility of the Director of Transportation. Employees responsible for assigned vehicles shall arrange to meet the established maintenance schedule.

2. Codes & Standards

Bear in mind that no architect, structural engineer, etc. has authority to order work done which is not in conformance with applicable codes.

If contract architect orders work which you know is contrary to District policy or not in the best interests of the District, notify Director of Construction.

3. Safe Practices for Construction

Loss of time and money are the result of construction accidents. A united effort is essential to eliminate injuries on construction projects. Such efforts will aid in the reduction of construction costs due to lower insurance costs.

This list of safe practices is for your use in the prevention of injury to yourself and those who work on School District construction projects. Each of these practices has proven its value in helping to prevent accidents.

A. Think Safety

Horseplay, scuffling and practical jokes are not allowed.

Always use safe practices. Help make the entire job safe.

Use all safeguards provided. They are there for your protection. See that they are kept in working position.

Watch out for the safety of others.

B. Your Own Safety

Be in good physical condition before starting work, with your alertness and ability not affected by illness or lack of sleep.

Anyone known to be under the influence of intoxicating liquor should not be allowed on the job while in that condition.

Wash thoroughly after handling anything that may injure or poison you--especially before eating.

All injuries, no matter how small they seem, should be reported and treated.

C. Your Clothing

Wear the right work clothes and shoes for your job - no long shoe laces.

Your clothing should allow freedom of action, but should not hang loosely.

Thin or badly worn soles must not be worn.

Wear a safety hat - protect your head from falling objects or tools. Be sure the hat band and laces are in good condition.

D. Protective Equipment

Wear head protection on all jobs.

Insist on the wearing of safety goggles when working near hazardous liquids and when grinding, sawing or chipping.

Workers must have eye protection suitable to the welding job they are doing. Harmful light rays from arc welding and sparks from cutting, burning and welding can cause injury.

Workers should wear shoes with non-skid soles and steel-toed shoes when working with heavy materials.

Safety equipment must be kept in a safe place so it will not get dirty or damaged.

E. Lifting Correctly

Always lift correctly: Take the strain with your legs, not your back.

To lift: Bend your legs, keeping your back straight, hold the object firmly and close to your body. Then lift, using your strong leg muscles, not your weaker back muscles.

Never lift while in an awkward position.

F. Handling Materials

Workers should not attempt to handle more than they can control.

Use all mechanical handling equipment provided.

Stay out from under suspended loads.

There should be no kinks in a wire rope before putting a strain on it.

Worn or frayed fiber or wire rope should not be used for hoisting.

G. Placing Ladders

See that the right ladders are used for the job.

Use a ladder with the right kind of safety feet or floor cleats for the surface upon which the ladder rests.

Ladders that are broken, weak, or have missing rungs should never be used.

When using a straight ladder, place it so that the distance from its foot to the wall is one-fourth the length of the ladder.

Always spread step-ladders fully, making sure the spreaders are in place before using.

Metal ladders should not be used when working near electrical equipment.

Jumping from an elevation is unsafe -- don't do it!

H. Climbing Ladders

Hoist loads with a rope or other mechanical equipment -- don't carry loads up ladders.

Use ladders and walkways instead of climbing around on scaffolds or falsework.

Don't climb so fast that it shakes the ladder.

Don't try to reach further than your arm's length from the ladder.

Tools should not be left on top of a ladder.

Hod carriers should not use extension ladders when carrying loads; their rung position and rope arrangement are a hazard for this trade.

Hot materials must not be carried up ladders.

I. Scaffolds

Wheels on rolling stages must be kept locked when the stage is in use; leg extensions must be secured.

Inspect the material to be used in constructing a scaffold to make sure it is not defective.

Single planks must not be used for walkways or permanent scaffold platform.

See that platforms are kept clear of unnecessary materials.

A back rail must be used on platforms ten feet high or over.

Locking fingers or rolling scaffold braces must be kept in working order and used as intended.

Platform planks should not be placed on the guard rail of a rolling stage.

J. Hand Tool Condition

Always use the right tool for the job -- keep them in safe condition.

Keep all saws, knives, planes and chisels sharp. A dull tool is a dangerous tool.

Be sure the hammer head fits tightly.

K. Hand Tool Use

Workers should never substitute tools. If it takes a lot of force it's not the right tool.

Extensions should never be put on a tool handle for leverage -- use a larger tool.

When possible pull on the handle of a tool -- don't push on it.

A file or screwdriver should not be used to punch, pry or chisel.

L. Power Tools

The safe way to use power tools is to read the instructions - then follow them!

The lift-lug on a power hand saw blade guard must not be wedged or tied back.

Electric cords with insulation worn through should not be used.

All portable or stationary electric tools should be grounded.

Power-actuated tools may be operated only by authorized persons.

An electrician should repair or adjust any electrical equipment.

M. Machinery

Stay away from machinery unless you have special authorization to operate or maintain them.

Loose or frayed clothing, dangling ties or finger rings must not be worn around machinery.

Turn on machines, electricity or compressed air only after seeing that no person will be injured by your doing so. Make sure guards and safety devices are working.

Running equipment must not be left unattended.

See that machines are stopped before repairing or adjusting.

Riding a crane or other hoisting equipment is prohibited.

There should be no operation of any machine or equipment within six feet of a power line.

N. Vehicles

Unless you are an authorized operator or mechanic, stay away from all vehicles and equipment.

Do not back a truck without having clear vision of what is behind you. If you cannot see, have someone guide you.

Examine excavation before back-filling. Be positive no one is in it.

Vehicles supported by jacks or chain hoists must be securely blocked before work is done under or around them.

O. Job Cleanup

There is no greater cause of injuries on a construction job than the careless storing or discarding of used materials. Useless material should be removed from the work area as fast as it accumulates so there are no tripping hazards.

Care should be exercised to keep tools, materials and equipment out of walkways and off stairways.

Wipe up spilled oil, water, paint or other liquids which might cause slips or falls.

Gasoline must not be used for cleaning.

Keep holes in floors, roofs or stairways fenced in or covered with planks.

4. Change Order Procedure (See form in Section VII)

A. Origin of Change Orders

1. Items on a Change Order must be inherent to the work and impractical to perform under a separate contract.

2. The commissioned architect shall write all Change Orders.

3. The following persons shall bring to the architect's attention items needing a Change Order and shall be recorded as such:

   a. Responsible architect
   b. Architect's Construction Inspector
   c. District Construction Inspector
   d. District Director of Construction
   e. Contractor

4. All other District personnel shall request changes by memorandum to the Associate Superintendent, School Facilities Division, with copies to the Director of Construction and Director of School Planning.

   a. Requests shall be reviewed for approval or rejection.
   b. Requests based on "desirability" shall be declined.

5. It is the responsibility of the School Facilities Division to determine if a proposed Change Order is necessary.

6. Change Order shall be processed promptly in order to:

   a. Prevent misunderstandings about their origin.
   b. Keep project expenditures and records current.
   c. Avoid delays in payments to the contractor.

B. Contractor's Quotation for Change Order Proposals

1. In accordance with contract documents, the contractor may submit a lump sum proposal for any change in the contract price, credit or extra. Quotations are to be submitted within 15 days from receipt of the Change Order Proposal request. Proposals shall be issued serially.

2. The architect will check the breakdown submitted (lump sum or other) and submit recommendations to Director of Construction.

3. Should the contractor and the architect and/or District be unable to agree on a lump sum quotation for any Change Order item, the contractor shall submit estimates in sufficient detail to permit verification of costs. Supporting items for the contractor's detailed quotation for an extra may be as follows:

   a. Subcontractor's quotations, if any.
   b. For work performed by the contractor:

      (1) Wages paid while performing the Change Order work, including time for the foreman while supervising same.
      (2) Material involved or consumed.
      (3) Rent or use of special equipment.
      (4) Cost of taxes, insurance and bonds.

   c. 15% of items a. and/or b. for profit, overhead, etc.
   d. The cost quotation should be consistent with reasonable market values for comparable work.

4. Supporting items for the contractor's detailed quotation on a credit may be as follows:

   a. Subcontractor's quotations.
   b. For work performed by the contractor

      (1) Wages
      (2) Material
      (3) Equipment rental or use
      (4) Taxes and insurance

5. Extensions of time will be allowed only if justified by the additional work on a Change Order.

C. Approval or Disapproval of Change Order Proposals

1. When the architect, contractor and School Facilities Division personnel agree on an extra, credit and/or time extension, the District shall and through the architect, authorize the contractor, in writing, to proceed with the change. Copies for the following:

   a. Architect
   b. Architect's Construction Inspector
   c. District's Construction Inspector
   d. Director of Construction
   e. Contractor

2. The District shall, through the architect, notify the contractor, in writing the rejection of proceeding with a Change Order Proposal. Copies as per item 1.

3. Approved Change Order Proposals shall be assembled for Change Order preparation by the architect for School District processing.

4. For extra work where a single item amounts to over $5000.00 or is "time and material", a Change Order is to be prepared for Board of Trustees approval prior to authorization for the work to be performed.

D. Preparation of Change Orders

1. The commissioned architect will have all Change Orders typed on standard AIA forms or Change Order form as furnished by the School District.

2. All Change Orders will be issued serially. Numbers of cancelled Change Orders will not be used again. Revised Change Orders will have the suffix "R" after the number.

3. Each Change Order item will have a terse lucid description of the change and reason for change.

4. Change Orders with more than one item shall have each item numbered in sequence.

5. The architect shall prepare the drawings required by the Change Order and key their numbering to the Change Order number.

6. Prints of the Change Order drawings shall be attached to all copies of the Change Order.

7. All Change Orders must be processed for District Board of Trustees ratification or approval before final contract payment is processed.

E. Distribution of Change Order Copies

1. District Director of Construction will retain two copies of the Change Order. He will then forward three copies to architect for distribution.

2. The architect will distribute the Change Order copies as follows:

   a. One copy retained by the architect for his permanent file.
   b. One copy to contractor for his permanent file.
   c. One copy to architect's inspector.

5. Architect Evaluation

A. Construction Supervision

The architect should provide general supervision of all work based on the drawings and specifications prepared by the architect and shall be in responsible charge.

The architect or engineer, or consultant employed or retained by the architect, should conduct regular and frequent visits to the site to inspect the work necessary to determine the quality of the contractor's performance as the work progresses and should visit the work promptly whenever requested to do so by the Director of Construction or District Inspector. The supervision of the architect and his engineers shall be in addition to the continuous inspection by the Inspector.

1. Shop Drawings and Equipment Lists

The architect should review and approve or reject shop drawings, material lists and equipment lists with respect to compliance with contract documents. No changes in or deviations from requirements of contract documents should be permitted at any time without prior approval from the District. The architect should submit one set of all approved shop drawings for the District's file.

The architect should investigate, recommend for approval or disapproval any substitution of materials and products where requested or required by the terms of the specifications, and should record all such substitution of items in the final as-builts.

2. Progress and Test Reports

The architect should make written reports to the District during the construction, stating the progress of the project and the problems arising during construction, the changes contemplated in the work, as a result of the problems and the progress of the work.

The architect should check all required material process test reports and report to the contractor and the District any deficiencies as reflected by said reports in such material and direct the action of the contractor in correcting such deficiencies.

3. Change Orders

The architect should prepare and send to the contractor and to the District any proposed Change Orders required during construction and should check all items of cost occasioned by such Change Orders.

The architect should not permit the contractor to commence work on any change which alters the function, quality, appearance or cost of the finished item of work without first obtaining the written approval of the District and of any other agency whose approval is required by law. The architect should send copies of all approved Change Orders to the District prior to the commencement of work by the contractor on the change. (See Change Order Procedure - Section 4)

4. Certificate for Payment

The architect should check the contractor's monthly request for payment and when satisfied as to the amount due, issue a proper certificate for payment of that amount in accordance with a uniform method acceptable to the District, advising the District that the contractor's request for payment is correct.

5. Interpretation of Intent

If during construction, any dispute should arise regarding the true meanings of the drawings and/or specifications, the architect should render an interpretation. Said interpretation would be subject to appeal to the administrators of the District, whose determination should be final. The architect should diligently protect the District's interest in his dealings with the contractor.

An interpretation may involve the preparation of supplemental drawings or large scale details needed to clarify contract drawings.

6. Final Inspections

The architect, with the assistance of the District, should make pre-final and final inspections at such times as he or the District shall determine that the project is substantially completed; and upon correction by the contractor of all deficiencies, should recommend acceptance of the project to the District.

7. Guarantees

The architect should secure in proper form and transmit to the District the guarantees, instruction manuals, parts lists, diagrams and charts required of the contractor.

8. As-Built Drawings

No later than thirty (30) days after completion of construction, the architect should correct the final working drawings, indicating all changes made by Change Orders or otherwise, under the construction contract, producing an "as-built" set of final working drawings which will show, among other things, the location of all concealed pipe, conduit runs and other such elements within the completed project.

The District should be furnished a complete set of duplicate tracings and should be of such quality that clear and legible prints may be made therefrom without appreciable and objectionable loss of detail.

9. Guarantee Period

Upon request of the District, the architect should recommend and direct to the general contractor the action to be taken, should defects in workmanship or materials be discovered after acceptance of the project and prior to expiration of the guarantee period.

B. Evaluation for the Reassignment of an Architect (See Report Form - Section VII)

School District personnel are not qualified to rate an architect except as they may be able to judge his past performance from inspection of the work to which an architect is assigned.

An architect can be expected to perform satisfactorily and efficiently only if he has had sufficient time and opportunity to learn the practices, procedures and policies of the client by whom he is employed.

1. Accuracy of Plans

Is there completeness, clarity, accuracy of plans and specifications, including those provided by the mechanical engineer, civil engineer, electrical engineer, structural engineer and the architect?

2. Willingness to Change

Is there a willingness by the architect to acknowledge the need for additional detail, additional drawings, specifications, etc. and to prepare Change Order plans and documents required to provide the School District with the product desired?

3. District Interest

Does the architect diligently protect the District's interest in his dealings with the contractor? (There should be no horse-trading to cover errors, omissions or matters of poor judgment which the architect or his consultants may wish to cover up at the expense of the District by making personal agreements with the contractors.)

4. Construction Supervision

What is the frequency and thoroughness with which the architect, mechanical engineer, electrical engineer and/or the consultants provide detailed supervision of the work?

5. Compatibility

Does the architect demonstrate his ability to "get along" with the representatives of the District and the contractor - the personality of the architect?

6. Space Meets the Program

Does the architect demonstrate his ability and willingness to listen and to learn about the operations of the school in order that the project be made functional and be made to facilitate the educational program of the District? (There is no merit in hiring an architect whose completed project requires the District to make its curriculum conform to the space provided because this space does not facilitate the operation of the District's program.)

7. Follow Instructions

Does the architect demonstate a willingness to follow instructions, both verbal and written and to use diligently all guides, standards, specifications and instructions provided by the District for his use?

8. Follow Through

Is the architect prompt in the matter of preparing schedules, expediting Change Order drawings, answering correspondence, etc.?

9. Recommendation for Improvements

Is the architect able and willing to ask questions and accept answers, to maintain constant surveillance over the job and to make recommendations for improvements?

10. Supervision

Is the architect the person who prepares or directly supervises the preparation of plans and specifications, or does he assign job captains or others whose experience is not worth the fee being paid? Will the plans and specifications be prepared by the same man who attends planning meetings and who is qualified in the field of school planning? Will the man who prepared the plans supervise the construction done according to these plans?

11. Budget Limitations

Does the architect stay within the budget and the "ability to pay" of the District? When he finds difficulty providing the facilities requested by the District within the budget does he speak up, or does he allow things to develop to the point where the completed project far exceeds the budget allocated to the project?

12. Consultant Fees

Does the architect pay full fee for the services of civil engineers, structural engineers, mechanical engineers, electrical engineers or other consultants, or does he do the work in his own office and only pay for signatures?

13. Correlation of Work

Does the architect correlate the architectural, mechanical, electrical, structural and other plans to insure that the contractor can build the facilities in the manner shown on the many sheets of the plans?

14. Accuracy of As-Builts

Are the as-built drawings provided to the District checked by the architect for both accuracy and completeness so that they will be usable by the District's Operations and Maintenance Divisions?

15. Keeping Up To Date

Does the architect keep informed on the types of construction, material, building components and equipment being developed for buildings?

16. Cost Evaluation

Does the architect evaluate all material, building components and equipment on a lifetime cost concept? This includes not only initial cost but also maintenance and operational cost as well as life expectancy.

17. Functional Facility

Does the architect demonstrate a practical knowledge of building material, building components and equipment so all items are chosen and installed properly?

18. Follow-Up

Does the architect go back to the project after it is completed to determine how well his product facilitates the program and to determine how it could have been done better, or does the architect only go back at the time of the dedication to take a bow?

The criteria cited above deal with first-hand information which the District should secure during the time the architect is completing his initial assignment for the District. If the District finds that he is failing to provide the services in any of the classifications listed above or in other important respects, he is a poor risk for another assignment.

SECTION VII

Report Forms and Paper Work

The following listed report forms shall be completed and distributed or maintained up-to-date. (Sample copies of all forms are enclosed with the exception of Item 14.) Procure forms from Construction Office secretary.

1. Progress on New Construction

   Maintain throughout construction period. Permanent typed copy for file.

2. Record of Construction Inspections

   At a designated location on construction projects, this form will be displayed for time of visit of each inspection including those inspections of the architect and his representatives.

   Distribute as follows:

   a. Original copy to Director of Construction and Office files.
   b. Inspector's file.

3. Weekly Construction Progress Reports

   Submit at the end of each week.

   Distribute as follows:

   a. Original copy to the Director of Construction and Office files.
   b. Architect
   c. General Contractor
   d. Inspector's file
   e. On Federal jobs submit one additional copy to local representative of HEW.

4. Field Data On Test Specimens

   These forms to be used when delivering concrete cylinders to laboratory. They may also be used to accompany grout and mortar samples, A.C. extraction tests, etc. Testing laboratory shall complete report in original and four copies.

   Distribute as follows:

   a. Director of Construction and Office file.
   b. Architect
   c. Contractor
   d. Testing Laboratory
   e. Inspector's file.

5. Monthly Request for Mileage Refund - Travel and Subsistence Claim

Submit copies in quadruplicate, as issued, of "Monthly Request for Mileage Refund" on or after the first day of the following month. This is for business mileage only. Mileage for District business from your first necessary business stop to your final business stop daily shall be listed. Mileage from your home to your assigned construction project and from your assigned construction project to your home is not chargeable to the District.

6. Record of Special Inspections

Throughout job progress maintain original and three carbons. At completion of a report, a copy is to be retained in the inspector's file and the remainder sent to the District Construction Office for distribution.

7. Report of Inspection by Locksmith

Request hardware inspection at least a week prior to final inspection. Prepare form in quadruplicate to be completed and signed by locksmith at the hardware inspection. The approved hardware list should be available for the locksmith making the inspection. (Only one hardware inspection is required when all buildings on the site are accepted for move-in at one inspection.)

Distribute signed copies as follows:

a. Director of Construction (original)
b. Architect
c. Contractor
d. Project Inspector
e. Locksmith Inspector

8. Change Order

Distribute signed copies as follows:

a. Director of Construction (original)
b. Architect
c. Contractor
d. Project Inspector
e. Architect's Inspector

9. Avoid Verbal Order

To be used in quadruplicate form as deemed necessary by inspector.

Distribute as follows: (This may vary depending on the type of item)

a. General Contractor (not subcontractor) - Green
b. Director of Construction - White
c. Architect - Pink
d. Inspector's file - Yellow

10. Roofing Check-off List

11. Final Inspection Check List

    Items on this list shall be verified as being complete prior to final inspection. All incomplete items shall be brought to the attention of the Director of Construction.

12. Guarantee Follow-up

    Record items reported to you by the Construction Office. Report completion of call-back items to the Construction Office secretary.

13. Architect Evaluation Report

14. Notify Director of Construction in writing of the disposition of final inspection specification and code violations.

PROGRESS ON NEW CONSTRUCTION
SCHOOL CONSTRUCTION DEPT.
CLARK COUNTY SCHOOL DISTRICT

Name of School

Estimated Project Cost

Address of School

Date of Board of Trustee's Approval

Project Description

Architect

Plans & Specifications
Start __________ Complete __________

Date Plans & Specs Received for Review __________ Date Approved __________

Date Sent to State Planning Board for Approval __________ Date Approved __________

Date of Issue for Bids __________ Bid Opening Date __________

Contract Awarded: __________ (Date) __________ (Contractor)

Construction Dates
Begin Complete

__________ (Amount) __________ (Construction Time)

Construction Schedule: Actual Date

25% __________
50% __________
75% __________
100% __________

Estimated	COSTS	Actual
	Land	
	Site Improvement - On Site	
	Off Site	
	Construction	
	Initial Equipment	
	Furnishings	
	Arch/Engineering Fees	
	Contingency	
	Total:	

	OTHER COSTS	
	Appraisal	
	Site Survey	
	Soil Survey	
	Testing	
	Total:	

Grades Housed	Classrooms					General Use	Facilities Provided	
	Item	Regular	Special	Kinder-garten	Total		✓	Sq. Ft.
	Number					Multi-Purpose		
	Normal Capacity (pupils)					Auditorium		
						Gymnasium		
	Area					Shower-Locker		
						Library		
						Cafeteria		
						Kitchen		

Total No. Sq. Ft.	Cost per Sq. Ft.	Type of Heat	Type of Air Conditioning

RECORD OF CONSTRUCTION INSPECTIONS

School Construction Department

Clark County School District

School

Architect

Construction Started

Date	TIME		Initials	Items Inspected (Brief)
	in	out		

Note: When sheet is filled return to School Construction Department

White Original: Director of Construction and Office file.
Yellow: Inspector

WEEKLY CONSTRUCTION PROGRESS REPORT
School Construction Department
Clark County School District

Project ______________________ Period From __________ To __________
Architect ______________________ Weather __________ Temperature ______

TOTAL CONSTRUCTION DAYS: ________ DAYS LEFT: ________ DAYS LOST: ________
(Attach Reasons)

AVERAGE NUMBER OF WORKMEN

CARPENTERS ________	STEEL ________	________
LABORERS ________	SHEET METAL ________	________
PAINTERS ________	PLUMBERS ________	________
PLASTERERS ________	ELECTRICAL ________	________
ACOUSTIC ________	MASONRY ________	________

% COMPLETE: _____ GENERAL WORK

_____ ELECTRICAL WORK _____ HEATING & AIR CONDITIONING WORK

WORK IN PROGRESS: ______________________________________

WORK COMPLETED SINCE LAST REPORT: ______________________________________

PROGRESS COMMENTS: ______________________________________

White Original – Director of Construction & Office Files
Pink Copy – Architect
Green Copy – General Contractor
Yellow Copy – Inspector

By ____________________

WEEKLY CONSTRUCTION PROGRESS REPORT
School Construction Department
Clark County School District

Project Charleston Elementary
Architect William F. Rossor, AIA

Period From 1/20/69 To 1/24/69
Weather Cloudy-Rain Temperature 65-70

TOTAL CONSTRUCTION DAYS: 134 DAYS LEFT: 28 DAYS LOST: 0
(Attach Reasons)

AVERAGE NUMBER OF WORKMEN

CARPENTERS	5	STEEL	1	
LABORERS	4	SHEET METAL	1	
PAINTERS	2	PLUMBERS	2	
PLASTERERS	6	ELECTRICAL	2	
ACOUSTIC	--	MASONRY	1	

% COMPLETE: 75 GENERAL WORK

80 ELECTRICAL WORK 80 HEATING & AIR CONDITIONIN
WORK

WORK IN PROGRESS: Installing miscellaneous iron on covered passageway.
Framing covered passageway.
Applying Cabot's stain to beams.
Installing plumbing vents through roof.
Installing rough heating in Office Building.

WORK COMPLETED SINCE LAST REPORT: All cement floors have been poured inside buildings.
All laminated beams have been installed.

PROGRESS COMMENTS: Architect and Mechanical Engineer inspected Monday, Wednesday and Friday, A.M.

White Original - Director of Construction & Office Files
Pink Copy - Architect
Green Copy - General Contractor
Yellow Copy - Inspector

By

DATA ON TEST SPECIMENS
School Construction Department
Clark County School District

Job:
Address:
Architect:
Structural Engineer:
Contractor:

Date:
___ Concrete
___ Mortar
___ Grout
___ Gunite

Laboratory Number:				
Mark on Specimen:				
Location in Structure:				
Cement, Brand				
Admixture				
Sand Source				
Rock Source				
Mix No. or Proportions				
Time in Mixer, Min.				
Slump, Inches				
Made By				
Date Made				
Date Received				
Date Crushed				
Diameter, Inches				
Area, Square Inches				
Maximum Load, Lbs.				
Crushing Strength, Lbs. Per Sq. In.				
Age Crushed, Days				
Unit Wt., Per Cu. Ft. (As Tested)				
Spec. P.S.I. at 28 Days				

REMARKS:

By ____________________

White Original - Director of Construction & Office File
Pink - Architect
Green - Contractor
Yellow - Inspector
Blue - Testing Laboratory

Clark County School District

CC-4 (Rev. 12/66)

TRAVEL AND SUBSISTENCE CLAIM

Employee Name ______________________ School or Location ______________________

Send or mail check to, (address) ______________________

Services Performed ______________________

CLASSIFICATION: ☐ Reimbursable ☐ Professional Growth ☐ Other ☐ Travel Advance Request

☐ Accumulated travel, normal duties, for the month of ______________________, 19______

☐ Special trip, *(Out of County)*. (Time/Date) ______________________

Return (Time/Date) ______________________

Date	Organization or Person Contacted	Per Diem	Fares Paid	Fares Charged	Own Car Miles
Totals					

Advance Requested $ ______________

Own Car @ 10¢ Per Mile ______________

Total Amount Claimed $ ______________

Emp. Sign ______________ Date ______________

(Less) Advance Rec'd. $ ______________

Supv. Sign ______________ Date ______________

Dept. Head or Dir. of Schools

Net Amount Due $ ______________

SEE INSTRUCTIONS ON REVERSE SIDE

TRAVEL

Tran.	Unit	Exp. Class	Loc.	Activity	Fund	Vendor	P.O. Number	$ Amount	Stat.	↓	↓
										10	5

TRAVEL & SUBSISTENCE CLAIM

Instructions for using form. See Staff Handbook Articles 4630 and 4631

COMPLETE IN TRIPLICATE. FORWARD ALL COPIES TO YOUR SUPERVISOR FOR APPROVAL FOR SUBMISSION TO THE ACCOUNTING DEPARTMENT. (ORIGINAL WILL BE FILED WITH COUNTY AUDITOR WITH COPY OF WARRANT.)

Reimbursable travel refers to certain kinds of travel expense within the School District that qualifies for reimbursement from the State Distributive School Fund. Article 4631 of the Regulations Handbook contains a complete description of this type of travel. Prepare **separate claims if part** of your expense qualifies for state reimbursement. The "Expense Class" code is not the same as for non-reimbursable expense.

Professional growth activities are described in Regulations Article 4611 and 4631. **Prepare a separate claim** for travel expense authorized for a Professional Growth activity. The expense class code is not the same as for regular travel or reimbursable travel.

Vendor Code. The Accounting Department may assign a code number to employees receiving travel expense, similar to codes assigned to stores and vendors doing business with the District. If you do not know your code number, leave the space blank.

Services Performed. Describe the work done, such as:
"Home visits with parents as Attendance Officer."
"To and from schools to repair equipment."
"Conference of ______ attended in ________."
"Attended training program at _________ authorized as Professional Growth."

List and describe any expense charged directly to the District with travel agencies or by credit card. **NO OTHER EXPENSES MAY BE CHARGED. DO NOT INCLUDETHESE IN TOTAL AMOUNT CLAIMED.**

The department supervisor shall enter, in the code strip, the proper Expense Class and Unit codes. Refer to your departmental budget to find the authorized codes.

Per Diem Rates. NRS 281.160 limits payment for subsistence to amounts not exceeding $20 for each 24 hour period of in state travel and not exceeding $25 for each 24 hour period of out of state travel. As an administrative regulation this is further specified as an allowance of:

		If Departure is by or before	If Return is by or after
Breakfast	$ 2.50	6:00 a.m.	7:00 a.m.
Lunch	$ 2.50	12:00 Noon	1:00 p.m.
Dinner	$ 5.00	6:00 p.m.	7:00 p.m.
Lodging	$10.00 and $15.00 for in state and out of state respectively, if time of return is after 2:00 a.m.		

These rates shall be allowed (for periods of service outside of Clark County) for portions of a day less than a 24 hour period.

RECORD OF SPECIAL INSPECTIONS

School Construction Department
Clark County School District

Project ____________________

Architect ____________________

Period From ____________ To ____________

Inspector ____________________

Construction Started: ____________________

% Construction Completed ____________________

Type of Inspection:
Electrical ( )
Heating ( )
Plumbing ( )
________ ( )

Date	Initials	Items Inspected and Discrepancies Noted

White Original - Director of Construction
Pink - Architect
Green - General Contractor
Blue - Inspector
Yellow - Other

LOCKSMITH INSPECTION REPORT

School Construction Department
Clark County School District

Project ____________________	Date ____________________
Architect ____________________	Inspector ____________________

The hardware inspection was held on ______________ (date). The following discrepancies were noted:

____
Locksmith

White Original – Director of Construction & Office File
Pink – Architect
Green – General Contractor
Yellow – Inspector
Blue – Locksmith Inspector

CONTRACT CHANGE ORDER

School Facilities Division
School Construction Department
2832 E. Flamingo Road
Las Vegas, Nevada 89109

No. ____________________

Date ____________________

____ Name of Project

____ Location

To: (Contractor) ____

You are hereby requested to comply with the following changes from the contract plans and in accordance with the following particulars:

Original contract price plus previous change orders $

Total addition, deduction this change order . . . . ____________

Adjusted contract price to date . . . . $

The contract completion time is unchanged, increased, decreased by __________ calendar days. This change order shall become an amendment to the contract and all the provisions of the contract will apply hereto.

ACCEPTED

APPROVED

____
Architect

____
Contractor Date

____
Director of School Facilities Construction
for the Board of Trustees

White (original) – Director of Construction & Office Files
Pink Copy – Architect
Green Copy – General Contractor
Yellow Copy – Inspector
Blue Copy – Architect's Inspector

CLARK COUNTY SCHOOL DISTRICT

Office of Director of Construction

NO. 100

AVOID VERBAL ORDERS

TO: ______________________________

FROM: ____________________ DATE ____________________

(Architect's Pink Copy)

ROOFING - CHECK OFF LIST

School Construction Department
Clark County School District

1. Is surface acceptable to manufacture?
2. Flashing adequate?
    a. Metal on top of roof?
    b. Metal in plastic cement?
    c. Counter or cap flashing on walls?
3. Roof equipment.
    a. Secured to structure?
    b. Flashed adequately?
    c. Extra protection necessary?
4. Expansion joints.
    a. Smooth installation?
    b. Raised off roof?
5. Traffic areas.
    a. Duck boards for ladders, walkways?
6. Drainage.
    a. Slopes to drains?
    b. Enough outlets?
7. Pitch pockets around.
    a. Brackets, guy wires, etc.?
8. DO PLANS AND SPECS AGREE?

FINAL INSPECTION LIST

SCHOOL CONSTRUCTION DEPARTMENT
CLARK COUNTY SCHOOL DISTRICT

PROJECT ____________________

Does Apply	Does Not Apply	
		A. Inspections by Affiliated Departments and Corrections Completed 1. Mechanical Engineer's final check of system.
		2. Electrical Engineer's final check of system.
		3. Final plumbing inspection and required form distributed.
		4. Final electrical inspection and required form distributed.
		5. Final heating inspection and required form distributed.
		6. Final hardware inspection and required form distributed.
		7. Fire Department inspection of fire water and sprinkler systems, smoke vents, and stage drapes.
		B. As-Built Drawings Ready for Submittal to Architect 1. Plumbing
		2. Heating
		3. Electrical
		4. Grading and Site
		5. Field Sprinkler
		6. Fire Sprinkler
		C. Certificates, Affidavits, Reports, etc. 1. Flameproofing certificates to Architect, District, and Fire Department. Also, affidavit on flame resistant material used in folding doors.
		2. Insurance certificates for contractors should be up-to-date at close of job.
		3. Change orders shall be processed and work completed prior to final inspection.
		4. On Federal jobs all payrolls (as required) shall be delivered complet HEW representative prior to final inspection.
		5. Guarantees that are for more than one year shall be turned over to maintenance. Guarantees for one year or less should be kept by the contractor.
		6. Maintain test reports of materials and fabrication until guarantee period expires (concrete, masonry, welding, glued lamination, reinforcing steel, etc.)

Does Apply	Does Not Apply	
		C. Certificates, Affidavits, Reports, etc. (cont'd) 7. Mill test cement certificates and weighmaster's certificate.
		8. Lamp schedule and fixture schedule.
		9. Certificates of specialized heating inspections and/or examinatio
		10. Operating instructions, wiring diagrams, CFM & GPM readings, servicing instructions, etc., as required for heating systems.
		11. Operating instructions, wiring diagrams, CFM & GPM readings, servicing instructions, etc., as required for air conditioning sys
		12. Operating instructions, wiring diagrams, GPM readings, servici instructions, etc., as required for lawn sprinkling system.
		13. Operating instructions, wiring diagrams, GPM readings, servici instructions, etc., as required for fire sprinkling system.
		14. Combinations for floor safes and combination padlocks.
		15. Parts list, catalog, and instruction manual for kitchen equipmen
		16. Wiring diagrams and operating instructions for intercom, clock and fire alarm equipment.
		17. Collect and identify by room number, operating instructions for all contractor installed equipment.
		18. Receive extra floor tile, hardware, carpet remnants, etc., as specified.
		D. Accumulation of Various Keys
		1. School Construction Dept.
		a. Grand Masters.
		2. Principal
		a. Door keys and masters.
		b. Cabinet keys and masters.
		c. "Wonder locks" for display cases and trophy cases.
		d. Sanitary napkin dispensers.
		e. Fire extinguisher cabinets.
		f. Access panels

Does Apply	Does Not Apply	
		D. 2. Accumulation of Various Keys - Principal g. Padlocks and keys for combination padlocks.
		h. Door closer adjustment keys and panic bar keys.
		i. Electrical panel boards.
		j. Master program clocks or "Simplex" units.
		k. Electrical lockswitch keys.
		l. Master fire alarm and break-glass station keys.
		m. Keys for dimmerboard and console.
		n. Keys and wrenches for controls on field sprinkler system.
		o. Dispenser keys (soap, towel, toilet tissue, etc.)
		E. Miscellaneous to be Checked 1. All yard areas graded and raked clean. Embankments shaped and cleaned. Walks and paving washed or swept clean with spots and stains removed. Chipped and broken paving patched. A. C. pads flooded for drainage test.
		2. Roofs cleaned and checked for adequate gravel coverage. Gutters and downspouts checked for drainage and leaks and to remove any possible stoppages.
		3. Broken glass (interior and exterior) replaced. Glass cleaned and polished.
		4. All debris including scaffolding and barricades removed from site.
		5. All fixtures (plumbing, electrical, etc.) and all equipment washed, polished, and/or dusted.
		6. Wood floors finished as directed. Vinyl asbestos tile floors cleaned with an acceptable tile cleaner. Terrazzo and concrete floors, base, and wainscots washed clean with all spots and stains removed. Carpets clean and all spots removed.
		7. Fencing inspected for specified bottom clearance; tautness of fabric, tension bars, and tension wires, operation of gates; and fitting make-up of nuts and bolts.
		8. Painting completed and touched up. This item includes playground and parking lines and required painting of mechanical and electrical equipment.

Does Apply	Does Not Apply	
		E. Miscellaneous to be Checked (Cont'd) 9. Check cabinets for free action of drawers and operating hardware.
		10. Miscellaneous Tools and Equipment. Open all cartons and check against specifications with contractor's representative just prior to final inspection to prevent possibility of theft or vandalism.
		11. Check number of padlocks which are supplied for roof hatches, lockers, fence gates, etc.
		12. Typewritten branch circuit schedules installed in panels as indicated on plans.
		13. "High Voltage" warning signs, "Gas Shut-Off" signs, etc. installed along with building and room identification signs and locker numbering where required.
		14. Pull wires installed in empty conduit.
		15. Engraved identification plates supplied on required electrical switches.
		16. Make a definite appointment with contractor for retrimming of stage drapes after final inspection, unless hanging interval permits retrimming prior to final inspection.
		17. Check clearance for darkening drapes from other projections.
		18. Bench marks and grading monuments shall be reset by contractor's engineer when damaged or destroyed.
		19. Door astragals supplied and installed as directed.
		20. Check dishwasher through wash and rinse cycle to assure proper operation and water temperatures.
		21. Check mounting of required dispensers--soap, toilet tissue, towel (paper and roller), toilet seat cover, sanitary napkin, make-up, etc.
		22. Check for installation of required number of map display rail fittings, roller shade brackets/double hanger sliding hooks and clips
		23. Identify required brass tags, signs, and specified bakelite markers for plumbing, heating, and electrical controls.
		24. Legal "Fire Alarm" signs to be installed at extinguisher cabinets enclosing fire alarm stations.
		25. All plaster and stucco patching accomplished in a neat workmanlike manner.
		26. Verify with city inspector the completion and acceptance of street improvement work included in the general contract.

Does Apply	Does Not Apply	
		E. Miscellaneous to be Checked (Cont'd) 27. Wrenches for removal of multi-purpose playground equipment caps.
		28. Completely check your job specifications to pick up any items that are not covered in the list above and/or any items peculiar to this job.
		F. Follow-up Items After Completion 1. Verify "as-built" drawings with Architect upon completion.
		2. Keep your job records, shop drawings, reports, all correspondence, etc., for a minimum of one year from the date of Board acceptance.
		3. Mid-year warranty inspection with Architect or his representative.
		4. End of year warranty inspection with Architect or his representative.

ARCHITECT ______________ CONTRACTOR ______________ SCHOOL ______________

INSPECTOR ______________ COMPLETION DATE ______________ PAGE ________

Date	Reported By	Complaint	Referred To	Action	Sent Letter	
					1	2

CONTRACTOR GUARANTEE FOLLOW-U
School Construction Department
Clark County School District

ARCHITECT PERFORMANCE EVALUATION

Date ____________

Project recently completed: ARCHITECT	5 - Excellent	4 - Very Good	3 - Good	2 - Fair	1 - Poor	0 - Deficient		
Accuracy of Plans								
Willingness to Change								
District Interest								
Construction Supervision								
Compatibility								
Space Meets the Program								
Follow Instructions								
Follow Through								
Recommendation for Improvements								
Supervision								
Budget Limitations								
Consultant's Fee								
Correlation of Work								
Accuracy of As-Builts								
Keeping Up To Date								
Cost Evaluation								
Functional Facility								
Follow-Up								

TOTAL